SHANNON RIVER.

RETURN to an Order of the Honourable The House of Commons, dated 19 May 1863;—*for*,

COPY "of a REPORT made by Mr. *Bateman*, C.E., to the Lords Commissioners of Her Majesty's Treasury, with reference to the Means of preventing INJURY by FLOODING to LANDS adjoining the RIVER SHANNON, and of the OBSERVATIONS of the Board of Works, *Ireland*, in relation to that Report."

Treasury Chambers,
19 May 1863.

F. PEEL.

SHANNON INUNDATIONS INQUIRY.

To the Lords Commissioners of Her Majesty's Treasury.

16, Great George-street, Westminster,
7th May 1863.

May it please your Lordships,

IN pursuance of the instructions which I had the honour of receiving, dated 16th July 1862, to inquire into the injury which is stated to have been done to certain properties in Ireland by the flooding of the River Shannon, I have carefully examined the district, and maturely considered all the questions involved in the inquiry.

Guided by the special instructions your Lordships were pleased to issue, I have made myself intimately acquainted with all the peculiarities of the river in its whole course from Drumshambo on Lough Allen to Limerick, and I have received the evidence and statements of the landed proprietors and others interested in the question, at public courts of inquiry, which were convened by public notice, and held at Limerick, Banagher Athlone, Longford, and Carrick-on-Shannon.

Shorthand writers' notes of the evidence given at these inquiries, and of important statements transmitted to me since their conclusion, accompany this Report.

I have received every assistance and information which I could desire from the Board of Public Works, Ireland, and from their officers, and I have endeavoured to make myself master of the important questions submitted to me.

My inquiry was limited to the following heads:

I. The extent of flooded land, and the height and duration of the floods, and the seasons in which they occur.

II. The causes to which the floods are attributed by the landowners.

III. Whether the injuries complained of have been aggravated or mitigated by the execution of the works for the improvement of the navigation of the river, under the Shannon Commissioners.

IV. The measures practicable for confining the flood-water within the natural channel of the river, or for lessening the injuries complained of, having regard to all the interests involved; and—

V. The cost at which such measures may be carried out.

Description of River.

The length of river and navigable loughs within the scope of the inquiry, amounts to a total of 160 miles, and the extent of land now affected by floods, according to the evidence of the proprietors, to about 19,000 acres.

The total acreage of the drainage ground, or rain basin of the river, and its tributaries to Limerick, is 2,806,400 statute acres; and the volume of great floods at that point is about 2,000,000 cubic feet of water per minute. The whole fall from Lough Allen to the sea at high-water at Limerick, a distance of 140 miles, is but 143 feet, and of this 97 feet are in the last 15 miles.

The river above the tideway is naturally divided into three districts, which may be called the Lower, the Middle, and the Upper Districts.

Lower District.

The Lower District consists of about 15 miles of river communicating with the tideway at the lower end, and having a fall, from Lough Derg at Killaloe to the sea at Limerick, of 97 feet. Little of this portion of the river is navigable, much of it being a rapid torrent, which has been evaded in the navigation by the construction of artificial canals inland.

Middle District.

The Middle District, from Killaloe, at the foot of Lough Derg, to Tarmonbarry a little above the head of Lough Ree, extends over a length of 85 miles; of this 23 miles are in Lough Derg, and 18 miles are in Lough Ree, being together 41 miles of lake navigation. The total fall is but 15 feet, which, of course, exists entirely upon the 44 miles of intervening and connecting length of river, being only four inches per mile.

Upper District.

The Upper District, from Lough Ree to Lough Allen on the Shannon, and to Lough Key, near Boyle, on the Boyle water, together with the Carnadoc waters, which extend to near Strokestown, is little else than a succession of small loughs, with here and there a piece of river or a rapid between.

With the exception of the land surrounding Lough Allen and that which bounds Lough Derg on the westerly side, there is scarcely any mountain land throughout the whole extent of the Shannon Basin, down to near the foot of Lough Derg. Much of it, in its natural state, consists of bog and flat land, and notwithstanding the great extent of country which the river drains, and the vast volume of water which is poured into the sea, the gentle slopes of the surface from which the rain flows, added to the modifying effects of so large an extent of lake and river surface, prevent any sudden rise in the waters, and, from the same causes, protract the duration of the floods by the slow and gradual manner in which the waters can pass away.

The land which immediately adjoins the river is exceedingly flat, and so slightly elevated above the ordinary surface of the water, that a rise of a few inches is sufficient to flood large tracts.

Operations of Shannon Commissioners.

When the Commissioners for the improvement of the Shannon commenced their operations, they found the river impeded by eel weirs and narrow bridges, and obstructed by shoals. They have removed the eel weirs, deepened the shoals, and increased the waterway of the bridges, so as to very materially enlarge the channel through which the water has to pass; and for the purpose of keeping up the summer level, or a navigable depth of water, they have, in lieu of the old obstructions by which the water was dammed up, substituted long regulating or discharging weirs.

Dimensions of Navigation, or size of Locks.

Influenced by the peculiar circumstances of the different districts and other considerations, the Commissioners executed the navigation on different scales of magnitude.

From Limerick to Killaloe.

From Limerick to Killaloe they made no alteration in the dimensions of the canal which had been previously constructed. The locks on this canal admit boats of about 80 feet in length and 15 feet wide, drawing from five to six feet of water in summer weather.

From Killaloe to Tarmonbarry.

From Killaloe to Tarmonbarry, one-half of the whole distance of 85 miles consisted of lake navigation, fitted for vessels of any convenient size, and as the whole fall was but 15 feet, surmountable by two locks, one at Meelick of eight feet, and another at Athlone of seven feet, and the intervening river was generally wide and deep, the locks were made 170 feet long by 40 feet in width, and the navigation

navigation adapted to vessels of six feet draught, in low summer water—the sills of the locks being placed one foot deeper, so as to afford seven feet below the surface of the water flowing over the weir.

Both the Grand Canal and Royal Canal, from Dublin, join the Shannon in this division.

From Tarmonbarry to Leitrim.

From Tarmonbarry to Leitrim, above Carrick-on-Shannon, and into Lough Key, near Boyle, the locks were made 110 feet by 30 feet, and the navigation suited to vessels of five feet draught, in low summer water.

From Leitrim to Lough Allen.

From Leitrim upwards into Lough Allen, at Drumshambo, the locks of an old existing navigation were retained, and the canal made suitable to vessels drawing 4 feet 6 inches of water. The locks are about 70 feet long and 15 feet wide.

The whole of the works have been most substantially executed, and with the exception of the old canal between Killaloe and Limerick, which has not been altered by the Commissioners, and which is capable of improvement, the navigation, as a whole, is as perfect a piece of work as can well be imagined.

Result of Works on Floods.

It was anticipated that the works for the improvement of the navigation, which I have thus briefly described, would materially relieve the adjoining lands from the floods to which they were subject, and so confer a benefit on the proprietors. That this expectation has, to a great extent, been realised, may in a general way be gathered from the following particulars.

In the fifth and final Report of the Commissioners for the improvement of the Shannon, presented to Parliament in 1839, before the commencement of the works, they state that they had had surveys made of the flooded or callow lands on the Shannon from Limerick to Lough Allen, and that the total contents of these lands amounted to 32,500 acres. They had also had a valuation made by Mr. Nicholson of the flooded lands between Lough Derg and Lough Ree: the extent of land thus valued, on this reach of the river, being 16,000 acres.

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In the eleventh and final Report of the Commissioners, under Act of 2 & 3 Vict., c. 61, in 1850, describing the works as completed, the Commissioners state that they have relieved by their operations 18,750 acres from lengthened or occasional flooding; and at the recent public inquiries, the evidence of Mr. Lynam, who was employed by the proprietors to ascertain these facts, was, that there are now about 19,040 acres in the whole liable to inundation; and from Meelick to Athlone, which includes 12,300 acres, or more than three-fourths of the district valued by Mr. Nicholson, the land still liable to floods is 8,500 acres, being in both cases about two-thirds only of the amount formerly inundated.

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See Notes of Evidence, p. 106.

Mr. Harding's comparative tables. *See* Notes of Evidence.

To prove this more particularly, I must refer to the tables put in by Mr. Harding, Valuator to the Board of Public Works, compiled from the daily registries of water kept by the lock-keepers and other servants of the Commissioners.

Corrections.

Some doubt having been raised as to the accuracy of the comparison drawn by Mr. Harding at particular places, I have examined all the doubtful points, and I have made corrections in three cases.

At Killaloe.

1. At Killaloe, the gauge on the upper sill of the lock pretty accurately represented the level of the water in Lough Derg *before* the works, but since the alterations which have been effected at the outlet of the Lough, this is no longer the case; and before a correct comparison can be drawn between the heights, as indicated before and after the execution of the works, an addition to the recorded depths, since their completion, must be made of from two or three inches in low, summer water, to 18 or 20 inches in great floods, in consequence of the fall in the river from the Lough to the weir, which now affects the gauge at the lock, by the removal of an embankment which formerly separated the canal approaching the lock from the river course near the weir. I have corrected Mr. Harding's table at this place accordingly, and given it in the Appendix.

At Athlone lower gauge.

2. At Athlone lower gauge, the recorded depths, since the completion of the works, are 4¾ inches too high, and (avoiding fractions) I have corrected this table also by the reduction of five inches.

At Athlone upper gauge.

3. The registry of the water at the Athlone upper gauge, at the new lock, does not afford means of accurate comparison in high water with the state of things as they existed before the new works, in consequence of the fall in the river between the point at which the old canal left it above Athlone, and the point at

which the weir and new lock have been erected below Athlone. On the 19th August 1861, the fall from Lough Ree (taking the Lanesborough gauge as indicating the correct level) to the gauge at the Athlone new lock, a distance of 2¾ miles, was 12 inches. Of this certainly more than half would exist between the entrance of the old canal and the new weir; so that on that day seven or eight inches would require adding to Mr. Harding's figures before a correct comparison could be drawn. Taking the highest water which has occurred since the works, viz., that of January 1853, the fall from the lough to the gauge at the Athlone Weir was 19 inches, of which 12 or 13 inches would be due to the length between the entrance to the old canal and the new weir. I have endeavoured to compute a table which will approximately show the true comparison, which I have added to the others in the Appendix.

At Roosky.

In all other cases, except at Roosky, I believe Mr. Harding's comparisons to be correct. At Roosky, I believe corrections are required similar to those which have been made at Killaloe and Athlone, but there are no observations which enable me to make them.

These tables show the average height of the water in every month, for several years before and after the works, as well as the highest floods during each month of these periods. They also give the highest water in each month of 1860 and 1861, when the most serious damage was done to the crops in the summer and autumn.

Included in the average subsequent to the execution of the works are the months of February 1852 and January 1853 when the floods were far the largest which have occurred during the whole period of observation.

Flood of August 1861.

The flood of August 1861, which continued to the end of the year, was also an exceptional case, as will be seen by the observations on this point in the Appendix. The rain which fell during that period, as deduced from the various returns of rain gauges within or adjacent to the Shannon Basin, which I have had the opportunity of obtaining, was quite unprecedented.

Deductions from tables.

In all cases, however, during the period of observation (excepting at Hamilton Lock, above Meelick, and generally along the river in August and the autumn months of 1861), the returns show that the height to which the water has risen is less than it was formerly; the difference in high water in most cases, whether taken on the average or with reference to the highest floods, being several feet. Indeed the only exceptions to this rule are at Hamilton Lock, and in the reaches between Limerick and Killaloe, and there there is no material difference. In the autumn of 1861, for the five last months of the year, it was certainly higher in some places than it had previously been.

Callows between Meelick and Banagher.

Mr. Harding has also deduced from these registries this fact, that the callows immediately above Hamilton Lock, between Meelick and Banagher, were covered more or less with water for 120 days, in the months of June, July, August, and September, during six years previous to the works; and for 11 days only, during the same months, in nine years ending with 1859, after the works.

Injury by floods lessened by works of Commissioners.

Much injury still sustained.

Mr. Lynenn's statement. Notes of Evidence, p. 38.

These observations will, I think, satisfactorily show that the injuries complained of by the landowners have not been aggravated by the works of the Shannon Commissioners, but, on the contrary, have been materially mitigated. Still the injury sustained is very considerable, and the liability to occasional flooding is such as to render the preservation of the crops very precarious, and to arrest all attempts at improved cultivation. It is asserted that "the prevention of the inundations would save property even in one year, to the value of more than 30,000*l.*"

Evidence of relief given. *See* Notes of Evidence, p. 70.

The relief given to the lands has in many parts been so great that, as was well observed by Mr. Robert Bournes, in his evidence at Carrick-on-Shannon, "persons were tempted into a false security, and put crops into low-lying lands which were never cultivated before, so that when the floods came on in 1861 the loss was far greater and more severe than if these lands had not been tilled."

They might well be tempted into this course, for, till the year 1861, the registries show that the height of the water was, as a rule, never so high as it had been previous to the works.

I think it probable that the quantity of water which now passes into the Shannon is greater than it was formerly, and enters more rapidly; but I cannot perceive from an examination of the registries, that there is any material difference in the seasons at which the highest water occurs.

Causes of floods as alleged by Landowners.

The landowners attribute the causes of the floods to which they are still subject, to the impediments opposed to the free flow of the water by the weirs and other works which have been executed for the maintenance of the navigation; and they allege that alterations and improvements may be made in these works, and in the channel of the river, which will effectually preserve the land from inundation.

Practicability of affording relief.

This brings me to the more important subject of my inquiry, viz., the practicability of confining the flood-water within the natural channel of the river.

The preliminary points to determine, with reference to this part of the question are, the quantity of water to be provided for, and the level to which the river must be kept down, to prevent it flowing over the adjoining lands.

Height to which river may rise without flooding.

On the latter point I have obtained most complete and minute information, by personal examination of the whole river, and by the information afforded me by the long-continued observation of the various lock-keepers and other permanent servants of the Commissioners, who are stationed at various wharfs and other places along the navigation.

Quantity of Water to be dealt with.

As to the quantity of water, I was supplied with a very valuable table of maximum floods at different points, compiled by Mr. Forsyth, Engineer to the Board of Works, from the ascertained discharges of various large tributaries within the Shannon Basin, and elsewhere from proximate and similar districts, modified and corrected by the great knowledge he had acquired of the subject, and by his intimate acquaintance with all the circumstances of the river. But feeling that on the correct determination of the quantity to be dealt with, depended the whole success of the work, I have had very careful measurements taken of the river itself, in high and low water, at Killaloe and Meelick, and I have been fortunate to obtain at both places measurements of the volume of the river when it was very nearly at the same height as in August 1861, when such serious damage was done to the country at large.

Mr. Forsyth's Tables. *See* Notes of Evidence, pp. 108 and 109.

Fresh measurements.

Volume of Flood of August 1861, at Killaloe.

I find by these measurements that the flood of 1861, which rose to 9 feet 2 inches over the upper sill of Killaloe Lock, was about 900,000 cubic feet per minute, and at Meelick, where the water rose to 8 feet 8 inches on the upper sill of Victoria Lock, it was 620,000 cubic feet per minute.

Highest summer Floods.

On looking at Mr. Harding's tables, I find that no summer or autumn flood has amounted to 9 feet on the upper sill of Killaloe Lock, except in the year 1861, when in August, September, and October, it varied from 9 feet 1 inch to 9 feet 5 inches. It further appears that in 12 months only, out of the 156 months to which the registry applies, has any flood exceeded 9 feet 6 inches, and these 12 instances are all in the winter months of December, January, and February, with one exception, and that exception is in March.

Highest Floods.

In February 1852, the water rose to 10 feet 6 inches, and in January 1853, to 10 feet 4 inches. The next greatest rises were in January and March 1848, when it rose to 9 feet 10 inches. It would thus appear that such provision for a flood of 9 feet 6 inches as would retain the water within the channel of the river, would effectually relieve the lands from all summer and autumn floods, and only on rare occasions, and to a slight extent, would any portion of the callows be covered in winter. A flood of this magnitude, viz., 9 feet 6 inches, at Killaloe, is by computation 1,100,000 cubic feet of water per minute, and it will probably be safe to assume 1,200,000 cubic feet, as the quantity to be passed with the water at this height. By computation upon the extreme height to which the water has hitherto risen in Lough Derg, the quantity discharged at Killaloe would appear to be 1,600,000 cubic feet per minute, agreeing exactly with the quantity stated by Mr. Forsyth. To this must be added something due to extended drainage, if the maximum quantity is to be provided for.

Volume of Floods at Meelick.

At Meelick, omitting such extraordinary floods as I have alluded to at Killaloe, the largest floods to be provided for would be about 850,000 cubic feet per minute. The maximum floods would appear to be about 1,300,000 or 1,400,000 cubic feet, which is a little more than Mr. Forsyth's computation.

I have examined other parts of Mr. Forsyth's tables, but the instances given will be sufficient to shew the general accuracy of his results, and so nearly do my calculations agree with his, both as to the maximum discharge of the river, and the area of the river basin in different parts, that it is not worth while burdening the Report with a second set of figures.

Effects of Arterial Drainage.

Before determining the maximum flood to be provided for, it is necessary to consider the effect of arterial drainage.

There can be no question that the drainage which has been carried out in the basin of the Shannon, has materially facilitated the escape of water from the drained districts, and has thus increased the rapidity with which the water rises in the Shannon, and the volume of water in times of flood. It would appear also, as a necessary consequence, that the river is rendered more liable to summer floods than it was previously.

Extent of Land Drained. *See* Notes of Evidence, p. 108,

The table of drained districts submitted by Mr. Forsyth, shows that out of the whole 2,560,000 acres of drainage ground to Killaloe, 1,221,323 acres have already been drained, (so far as the improvement of their outfall is concerned), under the drainage commission, being about one-half the total area.

Undrained Districts.

Included in that which is at present undrained, are the Scariff and Suck districts, both of which have been reported upon with a view to the necessary works being carried out.

River Scariff.

The Scariff district is 68,480 acres in extent and being mountainous will probably freely discharge its water.

River Suck.

The Suck district is 400,643 acres, and in its present condition will, from its great length and gentle slopes, only very slowly pass off its floods. If thoroughly drained, it is probable that its maximum discharge will amount to, but not exceed, the discharge of the Brosna, in proportion to the area.

There is no accurate information as to what the present discharge amounts to, but if it follows the same rule, when drained, which seems to have existed on the Brosna, the present discharge would be something under 300,000 cubic feet per minute, if the maximum discharge when drained is taken at 400,000, or one cubic foot per acre per minute.

Probable increase in volume by further Drainage.

After deducting the Scariff and the Suck, there would still remain 750,000 acres of undrained lands. Of these, about 100,000 are occupied by the loughs and the river, and about 200,000 are mountain land, the drainage of which will probably never be improved. Deducting these quantities from the 750,000, there would remain 450,000 acres which may, to a greater or less extent, be drained at sometime or other, and for the increased discharge from which provision must be made. This increase would probably not exceed 100,000 cubic feet per minute, and, added to the probable increase due to the Suck and Scariff, when drained, will make a total increase to the quantity to be provided for at Killaloe, of about 250,000 cubic feet per minute. Of this additional quantity, nearly 200,000 will have to pass the weir at Meelick.

Basis of calculations.

These calculations are made on the supposition that the whole rain basin is alike affected by rain, and each tributary discharging its maximum flood at the same time. It may be contended that the increased facilities which are given to the discharge of the water by arterial drainage, will enable the flood of one river to be passed off before that of another reaches the main channel, and it may be urged that so large a basin as that of the Shannon will never be equally affected by rain throughout its whole area. Such arguments may be well founded, but it is not only possible, but probable, that the rain-fall may be nearly universal, and that not unfrequently all the rivers may be discharging their maximum quantities at the same moment.

Small rise in River sufficient to flood Lands.

Under the peculiar circumstances of the flat lands adjoining the Shannon, where a rise of a few inches is just as destructive to the crops as a rise of many feet, and where increased depth, after the water is once over the land, adds but little to the whole acreage covered, it is essential to the success of any plan which has to be devised, that the relief shall be perfect and entire, except on occasions of such extraordinary rain as it would be impossible by any reasonable outlay to provide for, and which so seldom occur at a period which would be destructive of crops, that they may be safely disregarded. Security against the possible contingency would not be worth the cost of obtaining it.

Sources of information.

See Mr. Forsyth's Table. Notes of Evidence, p. 109.

Report and Evidence. Drainage of Land, Ireland, House of Lords, 1852.

I will not go into the particulars of all the information which I have had to consider in coming to the conclusions I have arrived at. I have had before me not only the measured discharges of the rivers within or contiguous to the basin of the Shannon, which vary from about ¾ of a cubic foot per acre per minute to 1½, but all the cases quoted by Mr. Mulvaney, in his evidence before the Lords' Committee on the drainage of lands in Ireland, in 1852, and all my own experience, and measured quantities of the discharges of rivers, under nearly all circumstances, in England and Scotland. The instances quoted by Mr. Mulvaney vary from a discharge of one cubic foot per acre per minute to 13 feet per minute, and many of my own observations amount to much larger quantities. All these facts have to be considered with reference to the physical character of the districts and the amount of their relative rain-fall, and approximate deductions drawn from them, in applying the information to the case under consideration.

Deductions.

The deductions I have drawn from all the information thus collected, have led me to assign a somewhat higher quantity than Mr. Forsyth to the district at the head of the Shannon; but this is so reduced again by the regulating effects of the loughs, and corrected by the measured quantities at lower parts of the river, that the difference between us disappears as we descend.

Volume of Floods proposed to be provided for.

I therefore propose to provide works at Killaloe for the passage of 1,200,000 cubic feet of water per minute without allowing the water to rise on the callow lands, and, at Meelick, for the passage of a flood of 1,000,000 cubic feet of water per minute, similarly confining the water to the river channel, and at all other parts of the river in proportionate quantities, always keeping down the surface of the river, so that scarcely any of the lands now flooded shall be ever affected.

These quantities are considerably more than the volume of the floods which damaged the crops in the autumn of 1861. They will include a fair proportion of the anticipated increase from extended arterial drainage and improved cultivation of the land, and they are equal to the greatest summer and autumn floods which have been recorded, though swollen with the increase due to drainage.

In the upper parts of the river, I propose to reduce the quantity to be dealt with by impounding in Lough Allen, but as I allow a higher quantity for that which flows from the ground, and have to add the amount due to extended drainage, the result in figures comes very much to what is given in Mr. Forsyth's table.

Lower down the river, below the great lakes, the quantities for which I propose to make complete provision are something less than the figures in his table.

Works may be carried out which will prevent injurious flooding.

After a careful survey of the river, I believe that works may be carried out which will everywhere prevent injurious floodings, and, at the same time maintain the navigation in all its parts in its integrity.

The requisite works however will be considerable; they will consist principally of increased facilities for discharging the water at the various weirs, and the enlargement of the river channel in shallow and contracted places.

Description of proposed Works.

In describing the extent of relief required, and the works to be constructed, it may, perhaps, be most convenient to begin at the head of the river.

Lough Allen.

The river may be said to take its rise in Lough Allen. This lough is about 8,000 acres in extent, and receives the waters flowing from about 100,000 acres of high mountain land. Its waters are discharged through a narrow and tortuous channel, and ordinary winter floods rise to about 3 ft. 6 in. above the level at which it is necessary to maintain it for purposes of navigation. Extraordinary floods rise 18 inches higher.

Proposed to be used as an impounding Reservoir.

The flood discharge will be from 1½ to 2 cubic feet per acre per minute, or from 150,000 to 200,000 cubic feet per minute in gross quantity. This is a very large contribution to the quantity of water which has to be provided for at Jamestown, below Carrick-on-Shannon, and the best use to which Lough Allen can be put is to make it into a large impounding reservoir, by damming up the outlet to present high-water level, and regulating the discharge by proper sluices.

The quantity of land now flooded on the margin of the lough is very small, and this arrangement would not increase it. The flood-waters, by being properly and gradually discharged, need never amount to what they do at present; they might frequently be withheld altogether at times when it would be inconvenient to discharge them, and sent down the river when its volume was so reduced that no injury would be sustained.

The beneficial effect of withholding so large a quantity of flood-water would be greatly felt to Jamestown: it would afford material relief as far as Roosky, and produce a sensible diminution of the floods, all the way to Lough Ree.

Lough Allen to Battle Bridge.

Between Lough Allen and Battle Bridge a considerable quantity of land is flooded. Mr. Lynam estimates the quantity, including that surrounding Lough Allen (probably 100 acres), at 840 acres. The flooding of this land is occasioned principally by the sluggish and tortuous channel out of Lough Allen, and by impediments at Wooden Bridge, consisting of a rocky shoal and a bridge with very small arches.

Above Wooden Bridge the river is joined by the River Feorish, which has a crooked and insufficient channel, and its discharge impeded a short distance from the Shannon by various eel weirs.

To relieve this land, it will be necessary to remove the shoal and old bridge at Wooden Bridge, and to cut a new channel from the outlet at Lough Allen to a small lake below called Lough Nagalliagh.

These works, with the impounding in Lough Allen proposed, would effectually relieve the lands from flooding, and reduce the level of the water in dry weather to four or five feet below the banks of the river near the junction with the Feorish. They will involve the destruction of an old mill site at Wooden Bridge; but the mill is now, and has, I believe, been long untenanted, and the site cannot be of much value.

Carrick-on-Shannon.

Battle Bridge to Jamestown.

The next length to be dealt with is from Battle Bridge to Jamestown, which includes the broad waters of the Shannon, above and below Carrick-on-Shannon, and the Boyle Water as far as Knockvicar, at the foot of Lough Key. The level of these waters must be regulated at Jamestown.

The land lies very little above the surface of the water, and a rise of 18 inches to two feet above the height necessary for navigation floods most of the callows adjoining the river. Mr. Lynam estimates the land liable to inundation at 1,100 acres.

In order effectually to free the lands at the upper end of this reach, the water at Jamestown should never exceed six inches above navigation level. With the weir in its present position, at the foot of a long narrow channel, half a mile in length, in which a considerable fall must exist to convey the quantity of water to be provided for, which is estimated at 350,000 cubic feet per minute, it would be difficult to reduce the water to the level required. In any case, considerable expense must be incurred in altering the weir for the discharge of nearly the whole of the water by sluices, and by making the approach equal to its conveyance.

Jamestown Weir.

I therefore propose that the present weir should be abandoned, and a new one erected above the bridge at Jamestown, with such an amount of sluices as would keep the water in maximum floods down to the required height. The channel below the new weir, may also require deepening, to enable it to carry the water freely away.

At Knockvicar nothing seems to be required. I had no evidence of injury by flooding round Lough Key.

Jamestown to Roosky and Tarmonbarry.

Below Jamestown the level of the water is regulated by the weir at Roosky, which also governs the level of the water past Carnadoe Bridge, through the Carnadoe waters to near Stokestown. Nearly the whole of this division is a succession of lakes, with small shoals between them, which have been dredged out for navigation purposes.

At Roosky provision must be made for the passage of 440,000 cubic feet per minute; but the ability to grant relief here depends upon works to be executed at Tarmonbarry, the fall being so small between the two that, at present, the weir at Tarmonbarry throws the weir at Roosky into backwater. I will therefore take these two places together.

Between Tarmonbarry and Jamestown the land to be relieved, according to Mr. Lynam, amounts to 1,550 acres.

Tarmonbarry.

At Tarmonbarry are the last lock and weir before before we arrive at Lough Ree, and there is always a clear and sufficient fall over the weir.

Roosky.

Here the water must be kept down so as not to rise above the height of the present weir; and such relief must be given in the river above as will prevent its rising more than two feet above the Tarmonbarry level at Roosky; and above Roosky the water must not be allowed to rise more than six or eight inches above the summer level at the weir.

To carry these arrangements into effect, the bulk of the water at Roosky must be discharged by sluices or other mechanical means, and the whole of it, say 500,000 cubic feet per minute, must be discharged in this manner at Tarmonbarry.

Carnadoe Waters.

Between Tarmonbarry and Roosky various shoals have been dredged out or excavated to a sailing channel of 150 feet in width. These must be widened to 250 or 300 feet, and above Roosky another arch of 35 feet span must be added to the existing one over the Carnadoe Water, and the approaches properly cleared out and deepened.

At Tarmonbarry Bridge the approaches must be improved by the removal of an island and shoals and other impediments, which now obstruct the passage of the water.

Rivers Camlin and Fallon, Tarmonbarry.

A short distance above Tarmonbarry, the Shannon is joined by the Camlin River, through a channel which is a branch of the Shannon, and through which the water flows, sometimes one way and sometimes another, according as the flood in the Camlin or Shannon may be the highest.

Along the banks of the Camlin and the Fallon, which joins it a short distance up, there is a good deal of low-land liable to floods, which will not be effectually relieved by the measures proposed above. These must be secured from inundation by being banked out from the rivers, and the waters conducted by a back drain through the ridge of land at Cloondra to the the river below Tarmonbarry. The water from the opposite side of the river to that on which the outlet will be, must be carried by syphons beneath the river.

From Tarmonbarry to Lough Ree.

From Tarmonbarry to Lough Ree, at Lanesborough, there is a length of river of 8½ miles, along the banks of which some land is flooded. To relieve the land, and to convey the waters brought down from above, shoals, about two miles in length, will have to be widened to double their present width.

Athlone.

I find that, to preserve the lands between Lanesborough and Tarmonbarry from flooding, the surface of Lough Ree must be kept down to 7 feet 6 inches, or at most eight feet above the upper sill at Athlone. To effect this, the water must be discharged, by sluices or other means, at the Athlone Weir, so as not to rise to a greater height than seven feet above the sill, which would allow three inches to go over the weir. This would meet the case in all but excessive winter floods.

Athlone to Meelick.

The next reach is the most important upon the river, whether as respects the extent of land liable to inundation, or the works which have to be constructed to enable the river to discharge the water within its own channel. It extends from Athlone to Meelick, below Banagher, a distance of about 27 miles; and the area of land still liable to flooding is, according to Mr. Lynam, 8,500 statute acres.

Fall in river.

In dry weather the fall in the surface of the water is very little, being scarcely appreciable, according to the levels submitted to me, between Athlone and Shannon Bridge (Shannon Bridge being just halfway), and only six inches from Shannon Bridge to Meelick. On a close examination of levels, I have reason to believe that the lower sill of the lock at Athlone is about 2½ or 3 inches higher than the upper sill of the Victoria Lock at Meelick; but this correction will still give less than one-quarter of an inch of fall per mile, on the average, between Athlone and Shannon Bridge.

In dry weather.

In the dry weather of May 1861, the water stood 7 feet 2 inches at the Victoria Lock at Meelick, 7 feet 8 inches at Shannon Bridge, and (making the correction of 3 inches) 7 feet 11 inches at Athlone; this shows a rise of 9 inches in 27 miles, or one-third of an inch per mile on the average.

In floods.

In floods, however, the case is very different. On the 22d of August 1861, while the water only rose 1 foot 7 inches at Meelick higher than the level given above, it rose 8 feet 3 inches at Athlone above the level in May, and the callows there were flooded four feet deep.

The manner in which the fall was distributed on that day will be evident from the following table:—

	Depth over Upper Sill of Victoria Lock.	Fall.	Distance.	Fall per Mile.
	Ft. in.	*Ft. in.*	*Miles.*	*Inches.*
Athlone - - - -	16 2	— —	— —	— —
Shannon Bridge - - -	14 8	1 6	14¼	1·263
Banagher - - - -	12 3	2 5	8½	3·411
Victoria Lock, Meelick -	8 10	3 5	4½	9·111

As the fall indicates the relative amount of impediment or obstruction to the flow of the water, it will be seen from this table that the greatest relief is required between Meelick and Banagher, and next between Banagher and Shannon Bridge;—the river above that point being, in its present condition, equal to the conveyance of flood-water with a very small amount of fall.

Of the fall which exists between Banagher and Meelick, much the larger proportion is from the foot of Counsellor's Ford to the Meelick Weir. This distance is only two miles, and on the 22d August 1861, the fall was two feet, or 12 inches per mile, out of the 3 feet 5 inches which existed on the 4½ miles between Meelick and Banagher. This is owing to the contracted channel through which the water has to pass at Keelogue, and so strong is the current at this point that serious inconvenience is felt in the navigation of the river.

Strong current at Keelogue.

The master of "The Shannon" steamer, which conveyed me up the river in August last year, informed me that in the year 1852 it took him seven hours to get up 200 yards against the current above Meelick, with all the steam on and all the men he could collect to haul, with a load of only 50 tons on board. This was probably an extreme case, but the navigation is difficult here at all times when the river is swollen.

Mr. H. B. Moore, of Shannon Grove, whose house and lands are just above Meelick, stated * that he had seen the navigation through the Victoria Lock stopped for weeks by the force of the current there; which obliged the tug steamers bringing the trade-boats to relinquish the new course, and resort to the old one through the Cloonaheenogue Canal, and that this was a thing of frequent occurrence.

**See* Notes of Evidence, p. 25.

In devising remedies, therefore, for preventing inundation at and above this point, it is important to keep in view the desirableness of improving the navigation also, and of lessening or removing the difficulties under which it now labours.

To preserve the land from flooding, it is necessary to keep down the water from Banagher to Shannon Bridge to a level of two feet nine inches or three feet lower than it rose to in August 1861, and from Shannon Bridge to Athlone to three or four feet lower than it rose to on that occasion. Between Banagher and Meelick a slighter reduction is required.

From Athlone to Shannon Bridge little or no alteration is necessary; a few shoals may require dredging, but that is all.

Shannon Bridge.

At Shannon Bridge some additional facility to the passage of the water may be given by cutting away a portion of the island which now obstructs the approach of the water to the bridge; and the convenience of the navigation would be increased by the erection of a guard or fender at the entrances of the arch of the bridge which is used by the boats.

River Suck.

Immediately below Shannon Bridge the Shannon is joined by the River Suck, and here we have the first instance, on a large scale, of the effect produced by the fertilising matter brought down by a river on which no lakes exist in which suspended matter is deposited. The rich lands called Bishop's Islands are principally due to the deposit of sediment brought down by the Suck.

Bishop's Islands.

The tributaries of the Shannon for the most part carry very little matter in suspension, and what they do bring is deposited in the broad waters or lakes through which the river flows. The channel is therefore for the most part permanent, and we are not generally hampered by considerations of how best to provide against the effect of shifting sands and gravel beds.

River Suck.

Considerable attention has been drawn to the Suck, and the necessity of improving its drainage in connexion with the Shannon has been strongly urged. Various reports and schemes for its improvement have been laid before me; but my instructions do not extend to this river beyond the necessity of considering it in so far as its outfall may be affected by the Shannon, and the additional quantity of water which will have to be provided for when any of the drainage schemes projected are carried out.

One project for lessening the quantity of water in the lower part of the river is referred to by the Shannon Commissioners in their final Report 1850, and is one of the schemes to which my attention was drawn.

This is a proposal for diverting the waters of the Suck from about one-third of its total rain-basin by a cut from Athleague to Lough Ree. However desirable this may be, the expense of the work seems likely to exceed the benefit; and as Lough Ree cannot bear any material addition to its waters, I have not ventured to calculate upon the proposal being carried out.

Meelick.

In considering the alterations required below Shannon Bridge it will be best to begin at Meelick.

Two schemes for relief.

Here two schemes of considerable magnitude, and of about equal expense, present themselves for consideration.

The existing channel is too small for the conveyance of flood-water; and if it is to be preserved for navigation purposes, the water, which it cannot now convey without injuring the lands above, and without rendering the current too strong for navigation, must be carried off by other means.

First scheme.

This can be accomplished by erecting extensive sluices, by which nearly the whole of the water must be discharged, at the entrance of the old easterly channel below Counsellor's Ford, which was closed when the navigation was made. This channel will have to be enlarged for the purpose, and carried from the point at which it is now dammed across, at the entrance to the Victoria Canal, by a new cut alongside the canal to the river below the lock.

The existing channel at Keelogue will have to be widened and materially deepened, and alterations made in the existing weir at Meelick, for passing a portion of the flood-waters. All the shoals between Keelogue and Banagher must be deepened, or the channel widened, so that the combined effect of all the works will be such as to bring down the level of the water at Banagher to three feet less in height than it rose to in August 1861. This is the first plan which presents itself.

Second scheme.

The other is to remove the weir at Meelick altogether, and to erect one of equal length, and at the same level, a short distance below Banagher Bridge, supplied with proper and sufficient sluices, abandoning the navigation in the river between this point and Meelick.

In substitution of the navigation thus abandoned, I would propose to cut a new canal, at the margin of the flooded land, from Banagher to the commencement of the old Cloonaheenogue Canal; to use this canal, after being sufficiently widened, as far as the bend above the Hamilton Lock, and from thence to form a new canal to the Victoria Canal just above the Victoria Lock, so as to use that lock without alteration—the canal to be made throughout on a scale sufficient for the passage of such boats as the locks are adapted for.

The effect of this alteration would be at once to relieve from flooding all the land from Banagher to Meelick, and to lower the water to the desired level at Banagher.

To insure the carrying off of the water from below the new weir at Banagher, so as to prevent the weir being thrown into back-water in flood, it would be necessary to open the old eastern channel, now closed up, to clear away the impediments which now exist within it, and to remove the embankment which has been built across it at its lower end above the present Meelick Weir; and it may possibly be necessary to increase the channel here and there, in shallow or contracted places, between Banagher and Meelick.

The navigation would be benefited by being made into a still-water navigation between Meelick and Banagher at all times and in all states of the water, and would thus be relieved from the disadvantage under which it now labours in times of flood.

Preference given to second scheme.

After a full consideration of both of these plans, as well as of all others which have occurred to me as possible under the circumstances of the district, I have a decided preference for the second, as being more certain of attaining the objects aimed at, and possessing advantages which cannot be conferred in any other way. I have shown this on the accompanying plans. The other will probably be understood from the description given.

Between Banagher and Shannon Bridge two great impediments to the free passage of the water exist in the contracted channel of the river at Derryholmes and Bishop's Islands. At both of these places considerable works were executed for making a good navigable channel when the navigation was constructed, and corresponding relief was given to the land.

The deep sailing channel at these places is about 180 or 200 feet in width, but it requires a channel of nearly 500 feet in width to pass the water, so as to afford effectual relief above.

Derryholmes.

At Derryholmes this can only be accomplished by excavation within the present channel of the river, and by widening it so far as may be required.

Bishop's Islands.

At Bishop's Islands the additional width may be given by widening and excavating to a proper depth a former old channel of the river, on the westerly side of the present one. Both these works are works of magnitude, but beyond them nothing will be required except a little dredging in soft ground at Leahinch, and some deepening beneath the arches at Banagher Bridge.

From Meelick to Portumna and Killaloe.

From Meelick to Portumna, at the head of Lough Derg, the land would be saved from flooding if the water could be kept down two feet lower than it rose to in August 1861, and the same observation applies to the land surrounding Lough Derg.

Killaloe Weir.

I propose to accomplish this by putting sufficient sluices in or adjoining to the Weir at Killaloe, and by improving the approach from the Lough to the Weir, so as to keep down the surface of the Lough, except in times of extraordinary flood, to eight feet six inches at the Pier Head at Killaloe, or about eight feet on the gauge at Portumna.

White's Ford.

Between Portumna and Meelick the only impediment is a shallow at White's Ford. This may be deepened, the channel straightened, and an old channel, now nearly choked up, cleared out and opened.

At

Approach to Killaloe Lock

At Killaloe considerable inconvenience to the navigation is now experienced by the strong current which exists from the Pier Head to the Lock, and the traffic is almost suspended when the water is high.

With the means of increased discharge which I propose, this inconvenience will be increased, and it will be essential to remedy the evil by constructing an embankment or wall, from near the Pier Head to the Lock, so as to put the approach to the Lock into still water.

Killaloe Bridge.

The water does not leave the Killaloe Weir sufficiently freely to prevent the weir being thrown to some extent into back-water, and it will be serviceable to remove some of the remaining old arches of the bridge immediately below, and to substitute others of larger span, so as to afford more waterway.

From Killaloe to World's End.

For a short distance below Killaloe the fall in the river is rapid, but there then comes a great extent of flooded land, which can only be relieved by works at the top of the Falls of Doonas, near Castle Connel, and at what is called the "World's End" Weir.

The canal from Killaloe to Limerick locks down into this reach at Cussaun, and leaves it again at Errina, a short distance above World's End. No alteration was made in this canal or the level of its sills by the Commissioners: what they did was to remove existing impediments, to enlarge the waterway of O'Brien's Bridge, and to maintain the level of the river at navigable depth by a weir at World's End.

The result has been to leave the river pretty much in the condition it formerly was, and the lands adjoining to nearly the same liability to flooding. Some improvement is certainly perceptible, but it does not amount to much.

World's End Weir.

The only effectual means of relieving the land is by making such alterations in the World's End Weir as will be tantamount to removing it nearly altogether in times of flood, and so deepening and widening the rocky shoal on which it stands, and which forms the head of the Falls of Doonas, as to allow the flood-waters to pass off more freely at a lower level than they are able to do at present.

This can be accomplished by excavating the bed of the river and by substituting for the present fixed stone weir suitable and sufficient sluices, to be so opened as to give free vent to the water in times of flood.

Some other comparatively minor impediments exist in the river, which may also be removed.

O'Brien's Bridge.

Five of the old arches of O'Brien's Bridge, which are of small span with large piers between, should be removed, and two iron arches, with a small intervening pier, introduced in their stead.

Parteen Shoal.

A shoal at Parteen, which has been partially dredged for navigation purposes, should be dredged out for the full width of the river; and dredging must be applied, whenever required, to the shoals which now temporarily accumulate at the mouths of several small tributaries, which bring down a large amount of "detritus." This is a peculiar feature of this portion of the river, and renders the maintenance of a good deep channel more difficult than elsewhere.

Mr. Lynam estimates the flooded land in the district now alluded to at 1,030 acres.

Errina Canal.

Before leaving the reach above World's End, I may observe that I carefully considered the relief which could be afforded by lowering the summer level of the river, and widening and deepening the highest reach of the Errina Canal. This portion of the canal has been cut through a long ridge of boulder-clay, and is much too narrow for convenient navigation. It might be materially improved, at comparatively small cost, but the mere lowering of the river by the reduction in height of the World's End Weir would not sufficiently meet the requirements of the case; and as the present summer level of the water does not interfere with the drainage or cultivation of the land, I saw no reason to reduce it, after determining the kind of alteration which was required at the World's End Weir for carrying off the floods.

From Castle Connel to Corbally.

From Castle Connel to Plassy, going down the river, little was done by the Commissioners.

From Plassy to Corbally, eel-weirs, islands, and other obstructions, which practically formed the dam by which this portion of the river was maintained at a navigable depth, were removed, and the Corbally Weir raised so as to keep up the water at the required level.

The removal of these obstructions facilitated the passage of flood-water, but on the whole there is little difference in the height of the floods before and after the works. As in other parts of the river, there is, no doubt, a perceptible improvement, except in the years 1860 and 1861; for in the lower parts of the river the height to which the water rose in the summer and autumn months of 1860 was very unusual, approaching to that of 1861, and to the maximum height recorded.

Some land on both sides of the river between Castle Connel and Corbally is liable to inundation, but owing to the fall in the river in this portion of its course, nearly the whole of it may be relieved without executing works within the river itself, which from its magnitude here, and the great volume of water to be dealt with, it is very desirable to avoid.

Flooded lands between Belleisle and Mount Daniel.

The highest is a tract of land on the right bank of the river, between Belleisle and Mount Daniel. This may be secured from inundation by an embankment alongside the river, high enough to shut out the floods, and by a drain or small river-course at the back of the embankment, continued underneath the steep slope or scar at Mount Daniel to below the Plassy Weir, where the water would be discharged.

Near Mount Shannon.

A small tract of land on the opposite side of the river above Mount Shannon could not be thus relieved, except by an embankment and a syphon beneath or over the river, if the value of the benefit to be conferred were worth the expense.

Near Annaghbeg Lock.

Going down the river, the land liable to flooding above and below the Annaghbeg Lock may in like manner be relieved by an embankment on the riverside, to be carried down as far as the Illanaroon Island below Arthur's Ferry, and by a back drain to communicate with an existing drain which discharges its waters below the Corbally Weir.

Between Plassy and Limerick. Groody River.

On the opposite side of the river, between Plassy and Limerick, some valuable land is flooded on both sides of the Groody River. This flooding may be prevented by the means proposed by Mr. John W. Kelly in 1850, when he was engaged to report on the drainage of flooded lands in the Limerick district.

This is a proposal to bank out the Shannon and Groody, and to carry off the waters which may accumulate behind by a syphon under the Groody and a back drain alongside the Limerick Canal, cutting through a gravel hill at Park Lock and discharging the water into the Abbey River below the Limerick Lock.

The flooded land which lies on the opposite side of the canal may in a similar manner be banked out from the Shannon, and the drainage water carried beneath the canal by a syphon, and discharged into the drain already described.

Limerick.

There remains only the land just above Limerick, which lies within the influence of the tide, and which is already embanked from the river and drained by means of sluices, which are opened at low water and in low states of the river.

It is alleged that this land cannot be sufficiently drained in consequence of impediments which exist in the river in and immediately above Limerick, which prevent the sluices drawing off the water low enough. These impediments are a reef of rocks on which the weir of the old Curragower Mill stood, the obstruction caused by insufficient depth at Thomond Bridge, and a reef of rocks above.

There is no doubt that the removal of these obstructions would go far to remedy the evils complained of, but the expense would be very considerable, and the end may be more easily and cheaply attained by other means.

Such means are suggested by Mr. Kelly in the report alluded to. They are to shut out from the Shannon the upper end of the Abbey River by an embankment across the mouth, to deepen the bed as much as may be required for drainage and sewerage purposes, and to bring across the Shannon, by a syphon-pipe from the other side, the drainage water of the land now inefficiently drained by reason of the outlets being too high for the purpose. The mill-power of Corbally Mills may also be improved and secured from back-water by the tail race being carries from the mills into the Abbey River thus shut out from the Shannon.

This course seems to me to be the best and cheapest which can be adopted. The Shannon would lose the advantage of discharge by the Abbey River, but a trifling height in the rise of the water would compensate for the loss, and a corresponding raising of the river embankments would be very much cheaper than any works which could be undertaken in the river itself, for removing impediments or facilitating the means of discharge; or the embankment across the mouth of the Abbey River may be provided with sluices, which would restore the use of the river in high floods whenever the height of the water would be injuriously influenced by the tides if the discharge were confined to the main channel only.

Explanatory plans.

I have marked the various works and alterations which I have suggested on the accompanying maps of the River Shannon, which are copies of those attached to the Reports of the Shannon Navigation Commissioners.

Time has not allowed me to take any fresh surveys or sections, or to prepare any detailed drawings; but I have obtained so much information from the enlarged plans and sections of the river, and of the executed works which, with other documents, were furnished to me by the Board of Public Works, that I have been able to lay down the suggested works, and to estimate their cost, with every feeling of confidence.

In some cases, such as the Camlin River near Tarmonbarry, and the lands between Castle Connel and Limerick, the works suggested might be undertaken by the proprietors without reference to the general question of the improvement of the Shannon; but, generally, one district is so involved with another that no important part can be treated separately. Hence it is impossible to carry out the work partially; and from the small limits within which the floods can be permitted to rise without flooding the adjoining land, any attempt to economize the cost by half-measures would be attended with disappointment.

Estimate.

I estimate the total cost of the requisite works at 283,000 *l.*; and in an Appendix I have given the estimate more in detail.

Probable benefit.

It is not part of my duty to inquire whether it is worth the while of the proprietors to incur this expenditure; but I may remark, that I think the flooded land exceeds, in some districts, the quantities named by Mr. Lynam, and that I believe the benefit to be derived will materially exceed his estimate. In the neighbourhood of Limerick, and from Shannon Bridge to Lough Derg, I am pretty confident that the advantage will be greater than he has assumed in estimating the average value of the improvement.

Between Limerick and Castle Connel, including the land immediately above Limerick, I estimate from Mr. Kelly's report, and other documents and evidence laid before me, that the extent of flooded lands will not be less than 1,500 acres, and from Castle Connel to Killaloe not less than 1,400 acres. Mr. Lynam only estimates 870 and 1,030 acres respectively; and if the evidence* of the increased value which would result from the land being freed from water is to be relied upon, the advantages to be gained would be very great indeed.

I have &c.

(signed) *John Frederic Bateman.*

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* *See* Notes of Evidence, pp. 18—29.

APPENDIX.

SHANNON INUNDATIONS INQUIRY.

Appendix (A.)

Estimate of Outlay required to make such Alterations in the River as will relieve the Lands from Floods.

		£.
Works at Outlet of Lough Allen, including damage to land on the margin of the Lough at present subject to flooding - - - - - - -		6,410
Wooden Bridge:		
Erection of a New Bridge, and deepening the Channel of the River, including purchase of Mill site, and improvements in the outlet of the River Feorish -		3,156
Jamestown:		
Removing present Weir, erecting New Weir and other Works above the Bridge, and deepening Channel of River below Bridge - - - - - - -		5,000
Roosky:		
Alterations in connexion with the present Weir, excavations in Channel above Weir, &c. - - - - - - - - - - - - - -		6,000
Carnadoe Bridge:		
Additional Arch, and clearing out Approaches - - - - - - -		1,500
Tarmonbarry:		
Works at Weir at Tarmonbarry, including excavations and enlargements in River between Tarmonbarry and Roosky, and purchase of land - - -		16,600
Embanking the Rivers Camlin and Fallon:		
Embankments and Back Drains, including purchase of land - - - - -		4,156
Between Tarmonbarry and Lanesborough:		
Excavations and Enlargement of River, including land required - - -		23,650
Athlone Weir:		
Works connected with the discharge of the water at the Weir, &c. - - -		6,000
Between Athlone and Banagher:		
Enlarging Channel of River at Derryholmes, including land for spoil,	£. 25,750	
New Channel at Bishop's Island, including purchase of land required for works and spoil - - - - - - - - -	26,666	
Excavations in other portions of the River, including land for spoil, &c.	7,850	
		60,236
Meelick:		
(First Scheme, described in Report; probable cost, £. 55,300.)		
Second Scheme:—Suggested alteration in Navigation between Meelick and Banagher; new Weir at Banagher; removal of existing Weir at Meelick; opening out of old Channels; deepening shoals on the River where required; Bridges, &c.; and purchase of land - - - - - - - -		56,646

	£.
White's Ford:	
Excavations and improvement in River, cleaning out entrance to Old Channel, including purchase of land required - - - - - - - -	4,356
Killaloe:	
Alterations in connexion with Weir, protection to present Navigation Channel, excavations in River above Weir, removal of Old Arches of present Bridge, and cost of replacing same with Iron Arches, purchase of land, &c. - -	20,092
Parteen:	
Excavation in bed of River, purchase of land for spoil - - - - - -	1,425
O'Brien's Bridge:	
Removal of Old Arches of Bridge and replacing them with Iron ones, excavations in River Approaches, &c. &c. - - - - - - - - -	5,500
World's End:	
Removal of existing Weir, replacing same with Sluices; deepening Bed of River between Weir and Castle Connel, including purchase of land for spoil - -	19,317
Flooded Land between Corbally Weir and World's End, Right Bank of River:	
Embankments, back drains, syphons, culverts, &c., including land required -	6,420
Flooded Land at the Groody River, &c. &c., Left Bank of River:	
Embankments, back drains, syphons, culverts, &c., including land required -	4,025
New Tail Race from the Corbally Mills to the Abbey River:	
Excavations, including purchase of land, &c. - - - - - - - -	2,270
Embankment across the Abbey River, exclusive of Sluices if required - -	1,000
Relieving Land at the opposite side of the River by a Syphon into the Abbey River, including embankments, back drains, and land required - - -	3,157
	256,916
Contingencies, 10 per cent. - - -	26,084
TOTAL - - - £.	283,000

7 May 1863.

J. F. Bateman.

APPENDIX (B).

OBSERVATIONS upon the FALL of RAIN in the Summer and Autumn Months of 1861.

FROM various sources I have been enabled to collect the following returns of Rain; and my acknowledgments are due to the Right Honourable Earl Rosse, the Right Honourable the Earl of Enniskillen, the Reverend Dr. Robinson, of Armagh, the late Mr. Cooper, of Markree Castle, Dr. Curtis of Queen's College, Galway, Mr. Kane of Tullamore, the Reverend Charles Mayne, of Killaloe, and others, for much of the information which I have obtained.

The rain which falls upon the more mountainous portions of the Shannon Basin may be considered to be approximately represented by that which has been registered at Galway, Markree Castle, Florence Court, and Killaloe. For the lower and flatter districts, which form so large a proportion of the Rain-basin, Tullamore and Armagh may be taken as the representatives.

Several of these places are not within the Shannon Basin, but they are near enough to be taken as some guide for the rainfall; and they may be assumed as correctly representing the relative wetness or dryness of different periods, and it is for this purpose that I more especially refer to them.

By glancing the eye over all these tables, it will be seen that the remarkable peculiarity in the rainfall of 1861 was the extraordinary quantity which fell in the harvest months of the year.

In Galway it amounted, in July, August, and September, to 25¼ inches out of a total fall for the year of 57¾ inches. In no other year during the 11 years of which we have records, did it amount to half this quantity during the same months, except in 1851, when there fell 17$\frac{4}{10}$ inches.

At Markree Castle, we have 12 years' records: here the rain, in the three months named in 1861, was 18½ inches, the total rain for the year being a little over 47 inches. This is 80 per cent. greater than the fall in these months in any other year except 1859, when the rain was 13 inches, being still 5½ inches less than in 1861.

At Florence Court the rain in the three months in 1861 was 21⅔ inches, considerably more than twice the fall in the corresponding period of any other year during eight years' observations, except in 1859, when there fell 13 inches, being still less than two-thirds of the rain in 1861.

At Killaloe, the Reverend Mr. Mayne has supplied me with 17 years' observations: here the autumnal rains seem on several occasions to have been heavy, but in no case do they approach that of 1861. In this year, in the three months of July, August, and September, the rain was 23¼ inches. The greatest previous falls in the corresponding period were 18½ inches in 1848, and 16¼ inches in 1859.

At Tullamore, where we get into a district of much smaller rainfall, and which lies in the middle of the Shannon Basin, the rain in the three months of July, August, and September, in 1861, was 13·86 inches. The observations extend over 15 years. In the year 1848, the rain in the corresponding period was 11 inches; and in three other years, viz. 1849, 1851, and 1859, it amounted to about 8½ inches. In the remaining years the rain in no case amounted to more than half that in the months named in 1861.

At Armagh, Dr. Robinson has kindly supplied me with returns extending over 23 years. The rain during July, August, and September of 1861 was 50 per cent. greater than in any previous year during this long period, and, with the exception of 7 or 8 years, about double the greatest falls in the same months.

The excessive fall of rain in the autumn of 1861 will be even more clearly exhibited when it is compared with any three consecutive winter months, when the rain, as a rule, is much greater than in the summer months.

In Galway (omitting a doubtful record, of nearly 22 inches, in the month of January 1852), there is only one instance, and that the excessively wet winter of 1852–53, in which the fall in three consecutive months approaches that in July, August, and September 1861, and even that is smaller.

At Markree Castle, again, it is only in the same winter months of November and December 1852, and January 1853, in which there is any approach to so heavy a fall of rain.

At Armagh, the rain in the winter of 1852–53 exceeded that in 1861, during the months referred to, about 38 per cent.; but there are only two other instances in which any three months, during the 23 years' observations, were equal to it.

At Killaloe, there is but one instance in which more than about two-thirds of the rain can be found in any three consecutive winter months. The solitary instance in which this proportion was exceeded was in the three last months of 1847, when the rain amounted to 20·14 inches, being still more than 3 inches short of the autumnal rain of 1861.

Tullamore and Florence Court tell the same story.

The excessive fall of rain in the summer and autumn of 1861 will be almost as strikingly seen if the month of June be added to the series for comparison; and I have therefore added a column to the tables, contrasting the rain, year by year, during the four months of June, July, August, and September.

(signed) *J. F. Bateman.*

TABLES OF RAINFALL.

GALWAY.—(Dr. Curtis.)

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of Year.	Rain in Three Months of July, August, and September.	Rain in Four Months of June, July, August, and September.
	Ins.	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*
1851	8·64	4·93	5·68	3·70	0·88	5·26	7·00	6·66	3·76	5·92	2·30	4·32	59·05	17·42	22·68
1852	21·87	8·87	1·15	0·96	1·72	6·36	1·72	3·12	1·44	3·50	7·86	8·50	67·07	6·28	12·64
1853	7·91	0·82	1·41	3·33	0·57	1·85	6·19	2·30	2·60	3·86	4·06	0·76	35·66	11·09	12·94
1854	4·94	1·08	2·05	0·25	3·41	3·97	2·88	2·15	2·53	3·70	2·76	5·13	35·45	7·56	11·53
1855	1·18	1·66	2·30	1·60	2·57	3·12	3·22	3·71	1·45	4·77	1·68	2·20	29·46	8·48	11·50
1856	2·68	3·89	0·45	2·31	3·38	2·45	3·95	2·80	4·77	1·72	2·43	6·04	36·87	11·52	13·97
1857	6·29	3·40	3·70	4·74	2·07	3·48	3·66	2·67	3·94	3·48	3·62	3·78	44·83	10·27	13·75
1858	3·66	3·10	2·33	3·18	2·43	1·55	3·55	3·58	4·75	4·23	1·96	6·90	41·22	11·88	13·43
1859	5·40	2·54	5·20	3·31	0·56	2·10	2·57	3·75	4·91	2·22	3·25	5·80	41·64	11·23	13·33
1861	3·24	4·58	6·89	1·22	1·09	2·70	6·41	8·49	9·38	3·91	5·85	3·77	57·62	25·28	27·07
1862	7·31	2·30	3·94	4·02	3·34	2·72	4·20	3·54	2·68	6·68	2·20	8·62.	51·61	10·42	13·14

MARKREE CASTLE, SLIGO.—(The late Mr. Cooper.)

1851	5·01	2·89	3·07	2·23	1·53	4·80	3·01	5·70	1·96	4·65	3·34	2·06	40·25	10·67	15·47
1852	6·07	4·32	0·73	1·06	1·34	5·47	3·34	5·20	2·15	4·00	4·66	7·38	45·72	10·69	16·16
1853	6·13	1·51	3·84	2·96	0·68	2·43	4·30	2·55	2·20	4·08	3·04	1·35	35·07	9·05	11·48
1854	4·24	2·21	1·87	1·07	4·08	2·96	3·15	1·80	2·73	3·86	3·87	5·70	37·50	7·68	10·64
1855	0·59	1·17	2·54	1·68	2·27	2·95	4·07	3·92	1·41	4·24	1·09	3·46	29·39	9·40	12·35
1856	2·66	2·11	0·71	0·77	2·85	2·22	3·45	3·46	2·34	1·59	2·18	3·72	28·06	9·25	11·47
1857	4·05	2·10	2·12	5·42	0·71	4·64	1·96	2·15	4·03	2·81	2·54	3·13	35·55	8·13	12·67
1858	2·27	2·12	2·49	3·82	2·86	2·18	2·97	2·81	2·29	3·60	1·03	5·61	34·05	8·07	10·25
1859	4·24	1·26	4·76	3·84	0·54	2·05	4·36	3·57	5·04	2·58	3·12	4·23	40·59	12·97	15·02
1860	5·01	2·83	4·13	1·94	5·20	6·20	2·48	0·87	1·38	3·76	2·37	1·57	43·74	10·73	16·93
1861	2·56	1·88	5·87	0·44	1·62	4·39	5·29	6·88	6·42	2·97	6·16	2·68	47·16	18·59	22·98
1862	4·64	0·92	3·22	3·01	2·58	2·56	3·72	2·86	2·57	6·46	3·08	4·29	39·91	9·15	11·71

FLORENCE COURT.—(Right Honourable Earl of Enniskillen.)

1854	3·67	1·92	1·66	0·28	2·44	3·09	4·22	2·02	2·28	5·78	2·46	6·00	35·82	8·52	11·61
1856	3·94	3·57	0·94	1·67	2·48	1·21	2·55	4·03	2·76	1·18	1·67	3·46	29·46	9·34	10·55
1857	2·85	2·87	5·19	4·28	0·95	2·97	1·53	1·96	2·35	1·74	2·07	2.97	31·73	5·84	8·81
1858	3·58	2·47	1·62	3·36	1·91	1·12	3·26	3·38	2·34	2·99	1·39	8·72	36·14	8·98	10·10
1859	4·46	2·51	4·77	3·52	0·39	1·47	2·60	4·06	6·43	1·93	4·43	3·60	40·17	13·09	14·56
1860	4·42	2·14	4·45	1·25	3·49	7·71	1·83	2·60	1·39	2·65	2·26	2·65	36·84	5·82	13·53
1861	3·33	2·76	6·58	0·89	0·26	3·95	6·90	7·41	7·35	3·39	4·44	3·91	51·17	21·66	25·61
1862	7·34	1·39	5·45	3·44	2·80	4·03	5·04	2·50	2·21	5·70	3·12	6·37	49·39	9·75	13·78

TABLES of RAINFALL—*continued.*

KILLALOE.—(Rev. CHARLES MAYNE.)

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of Year.	Rain in Three Months of July, August, and September.	Rain in Four Months of June, July, August, and September.
	Ins.	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*
1846	5·48	1·61	6·38	4·01	2·09	2·07	2·84	6·47	2·31	6·85	3·42	2·12	45·65	11·62	13·69
1847	3·30	4·38	1·22	3·26	4·22	1·28	1·01	1·75	3·51	4·45	6·87	8·82	44·07	6·27	7·55
1848	3·32	7.76	5·09	3·48	1·41	2·69	5·18	9·80	3·61	3·67	3·14	3·40	52·55	18·59	21·28
1849	7·47	3·06	1·15	3·59	2·45	0·73	3·51	3·23	4·38	3·89	4·29	2·82	40·57	11·12	11·85
1850	4·86	5·16	0·54	4·28	2·63	3·96	2·97	5·00	2·88	2·07	6·59	4·19	45·18	10·85	14·81
1851	5·88	2·16	3·75	1·45	1·35	3·51	3·32	3·58	1·49	5·35	1·88	1·55	35·27	8·39	11·90
1852	6·85	4·13	1·52	1·34	3·33	6·49	2·44	5·07	1·06	2·74	5·84	4·92	45·73	8·57	15·06
1853	5·35	0·80	1·99	2·54	1·28	2·79	4·32	2·21	2·21	5·72	3·74	0·96	33·04	8·77	11·56
1854	4·45	1·91	2·07	0·33	4·56	4·46	3·16	2·60	1·90	3·59	1·88	5·40	36·11	7·66	12·12
1855	1·06	3·96	3·62	1·78	3·85	3·60	3·66	3·42	1·80	3·76	1·65	2·51	34·17	8·38	11·98
1856	3·10	2·22	0·71	2·41	3·12	2·14	2·70	3·09	3·42	1·89	1·51	5·08	31·39	9·21	11·35
1857	3·66	2·05	3·14	3·88	2·26	2·07	3·15	1·78	3·37	3·19	3·20	3·27	35·62	8·30	10·97
1858	3·06	3·54	3.20	3·39	3·33	1·01	3·22	3·29	4·11	3·67	1·22	6·71	39·74	10·62	11·63
1859	4·81	2·70	4·87	3·55	0·34	2·49	5·06	4·37	6·63	2·15	4·42	4·60	46·19	16·26	18·75
1860	7·07	3·01	4·85	2·12	4·52	5·84	2·21	7·38	2·62	1·58	2·64	1·80	48·76	12·24	18·08
1861	2·15	3·51	7·22	1·16	0·50	4·23	6·85	8·83	7·60	3·45	5·67	2·67	53·72	23·28	27·51
1862	6·17	1·36	4·61	5·33	4·07	2·99	4·54	2·42	1·98	8·07	2·96	3·35	47·85	8·94	11·93

TULLAMORE.—(Mr. KANE.)

1848	1·45	4·47	2·52	3·20	0·68	2·76	2·33	5·90	2·61	3·39	1·27	2·79	33·59	11·04	13·80
1849	—	—	—	—	—	—	3·08	3·00	2·55	3·03	2·38	2·49	—	8·63	—
1850	1·76	1·43	—	2·50	1·60	1·78	0·88	2·95	1·80	1·55	2·84	1·86	20·95	5·63	7·41
1851	0·09	1·06	3·35	1·73	1·73	2·75	2·67	3·97	1·84	3·36	0·83	1·08	30·46	8·18	11·23
1852	4·08	3·59	0·78	1·25	1·60	6·30	2·35	2·80	0·85	1·58	8·58	4·26	38·30	6·00	12·30
1853	3·58	0·92	1·75	2·25	0·78	2·45	1·75	0·80	1·38	4·17	4·35	0·94	25·12	3·93	6·38
1854	2·15	1·62	1·45	0·35	4·38	3·65	3·32	1·01	0·79	1·51	1·37	1·78	23·38	5·12	8·77
1855	0·35	0·95	1·63	0·48	1·37	0·91	2·54	2·12	0·83	1·11	0·71	1·39	14·12	5·49	6·40
1856	1·14	1·41	0·87	1·37	3·94	1·64	1·51	1·86	2·05	2·18	0·74	3·03	21·74	5·42	7·06
1857	1·95	0·93	1·72	2·58	1·59	2·48	1·16	0·97	2·43	1·71	1·08	0·59	19·22	4·56	7·04
1858	1·48	1·40	2·22	3·43	2·16	0·48	2·28	1·74	2·50	2·00	1·42	3·14	24·25	6·52	7·00
1859	2·44	1·37	3·12	2·47	0·64	0·82	2·22	2·40	3·94	1·32	2·77	2·35	25·86	8·56	9·38
1860	4·04	0·98	2·22	1·52	3·30	4·99	2·00	3·53	1·40	1·18	2·30	1·93	29·39	6·93	11·72
1861	1·39	1·77	2·71	0·74	0·27	2·85	5·31	4·51	4·04	2·38	2·38	1·18	29·58	13·86	16·91
1862	4·44	1·17	2·74	3·00	3·13	1·94	2·52	2·89	1·59	3·16	1·82	2·61	31·31	7·60	8·94

ARMAGH.—(Rev. Dr. ROBINSON, F.R.S., &c.)

1840	4·935	2·751	0·463	0·760	3·024	2·601	3·154	2·656	2·424	1·256	3·448	2·818	30·192	8·234	10·735
1841	2·005	2·265	3·649	1·699	1·550	2·597	2·353	2·896	2·314	4·001	3·024	3·503	31·856	7·563	10·160
1842	2·794	2·726	4·226	0·033	4·077	2·419	3·009	2·976	2·861	1·978	4·707	3·005	34·801	8·836	11·255
1843	2·245	1·269	1·930	2·928	3·946	3·342	4·160	3·841	1·223	3·995	3·189	2·243	31·311	9·224	12·566
1844	2·636	3·239	2·888	1·670	0·042	4·472	2·361	3·068	2·226	4·351	3·002	0·532	30·487	7·655	12·127
1845	4·985	1·326	1·622	3·156	1·391	5·566	3·628	1·877	2·829	4·841	4·755	5·256	41·232	8·834	13·900
1846	—	—	—	—	—	—	—	—	—	—	—	—	37·967	—	—
1847	3·027	1·974	1·461	3·147	2·482	1·912	1·083	1·096	2·665	3·778	3·775	5·856	32·256	4·844	6·756
1848	1·867	6·754	3·759	3·320	1·239	2·733	3·920	3·476	2·379	5·147	3·693	3·011	39·318	9·775	12·508
1849	6·302	2·507	1·483	2·091	3·004	0·870	3·977	2·891	3·554	4·387	2·726	3·256	37·048	10·422	11·292
1850	4·083	5·035	1·235	3·507	2·414	2·371	3·142	2·720	2·711	2·240	3·214	2·462	35·134	8·573	10·944
1851	5·528	2·827	2·547	1·538	1·905	3·452	3·055	2·807	2·438	2·898	1·405	2·133	33·133	8·900	12·352
1852	7·807	5·719	1·279	1·445	2·176	5·659	1·698	2·873	1·814	2·563	7·536	8·681	49·250	6·385	12·044
1853	4·679	1·284	1·895	3·126	0·487	2·264	3·577	2·474	1·343	4·978	3·992	1·620	31·719	7·394	9·058
1854	4·589	2·620	2·093	0·213	2·565	4·651	4·780	2·454	2·084	3·399	2·920	6·364	38·732	9·818	13·969
1855	0·612	1·594	2·640	2·273	2·693	2·250	2·396	3·195	1·410	3·399	0·727	1·986	25·175	7·001	9·251
1856	2·262	2·271	0·752	1·046	3·011	2·089	1·492	2·689	3·487	1·490	1·466	3·862	25·917	7·668	9·757
1857	4·624	2·068	3·932	4·580	1·205	1·701	2·737	2·660	2·085	1·726	3·476	2·750	33·604	7·482	9·243
1858	2·053	1·518	1·566	5·858	3·365	0·944	2·937	3·139	2·061	2·760	1·228	4·585	32·019	8·137	9·081
1859	4·356	2·692	4·038	3·420	0·470	1·321	1·896	3·403	4·269	1·465	3·866	3·330	34·526	9·568	10·889
1860	5·744	2·061	4·172	2·119	2·977	4·188	1·437	5·211	1·228	2·901	2·049	2·266	36·345	7·868	12·056
1861	2·710	2·204	5·740	1·069	0·320	3·725	4·831	6·291	4·502	2·562	5·393	2·608	42·005	15·674	19·399
1862	5·758	1·269	3·701	3·466	3·550	3·599	4·550	2·176	1·817	5·904	1·964	4·361	42·115	8·543	12·142

APPENDIX (C).

ADDITIONS to Mr. *Harding's* TABLES of the Comparative Heights of Water along the Shannon, before and after the Works for the Improvement of the Navigation.

PARK LOCK—UPPER SILL.

MONTHS.	Average Daily Height.		Average Daily Height.		Highest.		Highest.	
	For 5 years before Works.	For 8 years after Works, ending 1859.	1860.	1861.	Before.	After.	1860.	1861.
	Ft. in.	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*
January - - -	12 4	11 7	13 6	9 11	14 11	16 2	15 2	10 5
February - - -	12 2	11 2	12 0	10 4	15 8	17 0	14 9	11 4
March - - -	10 9	0 8	10 9	11 11	14 1	12 6	11 2	12 6
April - - -	10 0	8 11	9 11	10 1	13 8	12 0	11 4	11 10
May - - -	8 4	7 10	7 11	7 0	11 4	10 8	8 6	7 11
June - - -	7 1	7 5	10 1	6 6	9 0	10 7	12 0	7 1
July - - -	7 3	7 3	0 0	8 5	9 6	10 7	10 9	10 8
August - - -	8 1	7 2	8 11	11 6	10 9	9 6	11 5	13 7
September - -	8 10	7 1	8 10	11 0	12 8	9 6	10 1	13 0
October - - -	0 4	7 11	9 2	12 5	13 10	10 10	11 0	13 6
November - -	10 0	9 5	8 11	10 7	12 11	13 4	10 7	12 9
December - -	12 3	10 6	0 9	12 2	15 8	14 0	11 0	13 8

ANNAGHBEG LOCK—LOWER SILL.

MONTHS.	Average Daily Height.		Average Daily Height.		Highest.		Highest.	
	For 5 years before Works.	For 8 years after Works.	1860.	1861.	Before.	After.	1860.	1861.
	Ft. in.	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*
January - - -	11 8	10 10¼	13 1	9 2¾	15 10	14 0	14 6	9 9
February - - -	11 5	10 9¾	11 5¾	9 8¾	16 0	14 0	14 3	10 8
March - - -	10 8¼	8 8¾	10 2	11 4¾	13 6	12 0	10 10	11 11
April - - -	9 0	8 0¾	9 3	9 5¾	12 9	11 2	10 8	11 5
May - - -	7 8	7 5¼	7 1¾	0 3¾	10 8	9 11	7 9	7 2
June - - -	6 8¾	6 7½	10 0	5 10	7 7	8 2	11 4	6 3
July - - -	6 11¼	5 11¾	8 0	7 7¾	10 6	7 10	10 1	10 0
August - - -	7 8¼	6 7¾	8 4¼	10 10¼	11 0	11 5	10 9	12 11
September - -	8 3¼	6 9½	8 2¾	10 2	13 0	10 1	9 3	12 4
October - - -	8 10	7 9	8 3¼	11 9	13 6	11 0	10 6	12 9
November - -	10 1	8 5½	8 3¾	9 9¾	13 1	12 3	9 3	12 0
December - -	11 8¾	9 9½	9 1	11 7½	14 9	13 1	10 6	12 11

Comparative Heights of Water along the Shannon—*continued.*

ERRINA LOCK—UPPER SILL.

MONTHS.	Average Daily Height.				Average Daily Height.				Highest.				Highest.			
	For 7 Years before Work.		For 12 Years after Works.		1860.		1861.		Before.		After.		1860.		1861.	
	Ft.	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*
January - - -	11	6	10	6	12	0	0	0	14	7	14	7	13	3	9	4
February - - -	11	4	10	5	10	8	9	4	15	2	14	6	13	3	10	0
March - - -	10	8	0	1	9	8	10	7	13	6	13	0	10	1	11	0
April - - -	9	10	8	6	9	1	9	3	11	10	10	3	10	0	10	7
May - - - -	8	5	7	10	7	10	7	3	10	3	9	10	8	2	7	10
June - - -	7	7	7	5	9	5	6	11	8	7	0	1	10	3	7	2
July - - - -	7	5	7	2	8	3	7	10	9	4	9	4	9	7	8	9
August - - -	8	4	7	4	8	3	10	1	10	10	10	6	9	4	11	7
September - -	8	11	7	5	8	5	9	8	12	7	9	10	9	1	11	7
October - - -	9	4	7	11	8	5	11	2	13	0	10	7	9	2	12	0
November - - -	10	7	8	11	8	5	9	8	12	11	12	2	9	1	11	1
December - - -	11	9	9	9	8	11	11	1	14	0	13	0	9	7	11	11

CUSSAUN LOCK—LOWER SILL.

MONTHS.	Average Daily Height.				Average Daily Height.				Highest.				Highest.			
	For 7 Years before Works.		For 12 Years after Works.		1860.		1861.		Before.		After.		1860.		1861.	
	Ft.	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*
January - - -	12	0	12	0¼.	13	11	0	11¼	15	5	17	0	15	3	10	4
February - - -	12	1¼	11	10¾	12	3	10	5	16	8	17	5	15	3	11	4
March - - -	11	1½	9	9¾	10	10¼	12	2	14	1	12	9	11	4	12	9
April - - -	9	8¾	9	3	9	11¾	10	3¼	12	1	11	8	11	3	12	0
May - - - -	8	3½	8	5	8	0	7	4¼	10	1	10	10	8	7	8	1
June - - -	7	3½	7	11¾	10	7¾	6	11	8	3	10	8	11	8	7	2
July - - - -	7	0½	7	9	8	9½	8	3¾	9	1	10	10	10	9	9	5
August - - -	8	5½	7	9	8	10	11	5	10	1	9	5	10	5	13	7
September - - -	7	0¾	7	10½	8	11	11	0¼	13	0	10	3	9	11	13	5
October - - -	9	7¾	8	5¾	8	11½	12	10½	13	7	12	5	10	0	14	0
November - -	11	1	9	11	9	0½	10	8¾	13	5	14	5	10	0	13	0
December - - -	12	10¾	11	1	9	8¾	12	9	15	3	15	5	10	8	13	10

In these four Tables, the columns showing the Highest Water before and after the Works have been supplied from Mr. Harding's figures, in his General Schedules at the end of the Notes of Proceedings, pp. 80 *et seq.*

J. F. B.

APPENDIX (D).

Corrections of Mr. *Harding's* Tables.

KILLALOE LOCK—UPPER SILL.

TABLE showing the Comparative Highest Water before and after the Works, as corrected by the addition of from 2 to 20 inches to the Heights after the Works, as given by Mr. Harding, for the reasons explained in Report, page 3.

MONTHS.	Average Daily Height.				Average Daily Height.				Highest.				Highest.			
	For 7 Years before Works.		For 11 Years after Works.		1860.		1861.		Before.		After.		1860.		1861.	
	Ft.	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*
January - - -	12	2	8	11	9	4	8	4	14	7	11	11	11	1	8	10
February - - -	12	9	8	11	8	11	8	6	15	3	12	2	11	1	0	6
March - - -	11	7	8	5	8	7	8	11	13	10	11	4	9	3	10	2
April - - -	10	6	8	1	8	4	8	5	12	6	9	8½	9	3	9	10½
May - - - -	0	5	7	10	7	5	7	6	10	9	10	5	8	4	8	0
June - - -	8	6	7	8	8	6	7	6	9	3	0	10½	9	6	7	9½
July - - -	8	4	7	7	8	0	7	10	0	7	8	9	9	1	8	7½
August - - -	9	2	7	8	8	0	8	8	10	7	9	6	8	10	10	3½
September - -	0	8	7	8	8	1	8	7	12	11	0	1	8	7½	10	2
October - - -	10	1	7	10	8	0	9	1	13	3	9	10½	8	9	10	8
November - - -	11	4	8	4	8	1	8	7	13	2	10	6	8	7½	10	2
December - - -	12	7	6	8	8	3	9	0	14	10	11	1	0	1	10	6

ATHLONE LOCK—LOWER SILL.

TABLE showing the Comparative Highest Water, before and after the Works, corrected by the deduction of 5 inches from the Heights after the Works, as given by Mr. Harding.

MONTHS.	Average Daily Height.				Average Daily Height.				Highest.				Highest.			
	For 8 Years before Works.		For 10 Years after Works.		1860.		1861.		Before.		After.		1860.		1861.	
	Ft.	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*
January - - -	9	11	8	6	10	8	6	7	12	3	13	4	11	5	6	8
February - - -	9	11	8	3	8	11	7	1	13	1	12	6	11	7	7	10
March - - -	9	5	6	1	7	8	9	1	11	6	8	8	7	10	9	7
April - - -	8	2	5	4	6	4	6	8	10	3	8	1	7	10	8	1
May - - - -	6	8	4	0	3	11	3	1	8	1	6	2	3	10	3	4
June - - -	6	1	3	7	7	6	3	0	7	11	4	8	8	4	3	3
July - - - -	6	1	3	6	4	9	4	3	7	6	7	4	7	1	6	1
August - - -	6	10	3	6	4	6	8	7	8	4	6	4	6	7	10	9
September - -	7	6	3	7	5	1	8	1	10	9	7	6	6	2	10	7
October - - -	7	8	4	6	6	0	5	11	11	3	9	8	6	1	11	2
November - - -	8	11	6	3	6	3	7	7	10	10	10	7	6	0	10	7
December - -	10	1	7	5	6	2	9	11	12	7	12	7	7	5	11	0

ATHLONE LOCK—UPPER SILL.

TABLE showing the Comparative Highest Water before and after the Works, approximately corrected by additions to the Heights after the Works, as explained in Report, page 4.

MONTHS.	Average Daily Height.				Average Daily Height.				Highest.				Highest.			
	For 8 Years before Works.		For 10 Years after Works.		1860.		1861.		Before.		After.		1860.		1861.	
	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.
January - - -	9	2	8	7	7	0	5	9	11	5	10	5	8	7	6	5
February - - -	9	2	5	5	6	0	5	10	11	0	9	7	8	7	0	8
March - - -	8	9	5	9	6	1	6	5	11	0	7	11	6	7	7	2
April - - -	7	10	5	0	5	10	5	9	9	8	0	9	6	7	0	8
May - - -	0	8	5	2	5	2	4	10	8	0	8	9	5	5	5	4
June - - -	6	0	4	11	6	0	4	8	6	7	6	1	6	8	4	11
July - - -	5	10	5	0	5	5	5	1	7	0	6	7	6	5	5	8
August - - -	8	3	5	2	5	0	6	2	7	0	8	10	6	0	7	8
September - -	6	8	5	1	5	5	0	0	8	1	9	6	6	6	7	3
October - - -	7	2	5	4	5	4	6	8	10	2	8	8	0	0	8	1
November - -	8	3	5	10	5	6	5	11	10	1	9	1	0	0	7	5
December - -	9	8	6	2	5	9	0	9	12	4	9	1	0	5	7	11

APPENDIX (E).

Additional Tables furnished by Mr. *Harding.*

PORTUMNA BRIDGE.

Highest and Average Daily Heights of Water for the Months of the following Years:—

The figures in the first line of each year show the Highest Water in each month; those in the second line, the Average.

Years.	January	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.
1851 -	11 7	11 3	9 7	9 5	7 11	8 3	7 7	7 7	7 6	8 7	8 1	8 5
	9 10½	10 0½	9 0	8 7½	7 7½	7 9	7 4½	7 4¾	7 2⅔	8 2¼	7 10	8 1½
1852 -	11 6	12 5	9 8	7 8	8 0	9 4	9 4	8 2	8 0	7 7	11 10	—
	9 8½	11 7	8 2½	7 4½	7 4	7 10	8 5½	7 10	7 4	6 11¼	10 6¾	—
1853 -	14 1	11 11	8 10	9 4	8 8	7 4	7 9	7 5	8 0	9 8	11 8	8 7
	13 2½	8 11⅓	8 4¼	8 9	7 6¼	8 11¼	7 5	7 0¼	7 3½	7 11¼	6 10⅔	8 4½
1854 -	10 8	10 5	9 2	8 0	7 3	7 8	8 2	7 5	7 2	7 11	8 2	10 9
	9 0½	9 10½	8 3½	7 2	6 11	7 2¼	7 10¼	7 1½	0 11¾	7 0¼	7 10⅓	9 3½
1856 -	- -	- -	- -	7 11	8 5	8 3	7 4	7 7	8 0	8 7	7 9	10 8
				7 7¾	7 7¾	7 7¼	7 1¾	7 3½	7 1	7 11½	7 6	9 1¼
1858 -	10 1	8 6	9 4	9 7	8 7	8 3	7 2	7 2	7 8	7 8	8 0	11 7
	9 8	9 0½	8 0½	8 10	8 2	7 5¼	6 11½	8 11¾	7 0¾	7 8¾	7 0¼	9 11½
Average	10 2½	10 2¼	8 5⅔	8 0¾	7 0¼	7 5½	7 6½	7 3¼	7 2	7 7	8 4¼	8 11¾
1880 -	9 1	9 1	8 3	8 2	7 8	9 3	8 7	8 6	8 1	8 6	8 1	8 3
	8 7½	8 4⅔	8 0¾	7 10¼	7 2⅔	8 8	7 7	7 7½	7 8	7 9¼	7 7	7 10¾
1881 -	8 4	8 11½	10 1	8 2	7 2	6 11	8 1	10 3	10 6	10 8	10 1	10 4
	8 1¼	8 5¼	9 8¾	8 3¼	8 9¾	8 7¼	7 4¼	9 1¾	8 6¾	9 9	8 8	9 8½

Note.—The Portumna Gauge may be taken to represent the level of the water in Lough Derg. The zero of the gauge is about 6 inches higher than that of the gauges at Killaloe. The level of the water is influenced by wind.

J. F. B.

LANESBOROUGH.

Highest and Average Daily Heights of Water for the Months of the following Years:—

The figures in the first line of each year show the highest water in each month; those in the second line, the average.

Years.	January.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
	Ft. in.	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in*	*Ft. in.*	*Ft. in*	*Ft. in.*	*Ft in.*	*Ft. in.*	*Ft. in.*
1852	10 10	12 0	9 0	7 4	7 4	8 6	8 7	7 9	7 10	7 2	10 5	12 6
	9 7½	11 2	8 1	7 2	7 2¼	7 4	8 3	7 8¾	7 6	8 10	9 3½	10 7½
1853	12 11	10 7	8 0	8 8	8 4	7 11	7 0	7 5	7 5	8 6	9 6	8 7
	12 1	9 0¼	8 0½	8 4½	7 6	6 7¾	7 4	7 0¾	7 2¾	7 7¼	9 1¼	8 0¾
1854	10 0	10 7	8 6	7 9	9 10	0 10	7 10	7 11	7 1	7 10	8 0	9 0
	9 0½	9 4¾	8 1	7 8½	7 9	8 0½	7 8	7 3¼	7 0½	7 1	7 9½	8 8½
1855	9 2	7 9	9 1	8 2	7 3	7 3	7 5	7 7	7 4	8 1	8 3	8 6
	8 2¾	7 1	8 6¼	7 8	7 0¾	7 1¾	7 2¾	7 5½	7 2	7 5½	7 11	7 6
1858	8 9	8 9	8 7	8 10	8 1	7 11	7 0	7 1	7 2	7 6	7 4	9 11
	8 6½	8 5½	8 2½	8 8¼	7 11¼	7 5	6 10	8 10¾	7 0½	7 3	7 2½	9 0¼
1859	9 11	9 7	8 10	9 0	7 9	7 0	6 10	6 11	8 2	8 4	8 10	9 6
	9 0½	9 1½	8 4½	8 5¼	7 5	6 11½	6 9½	0 10	7 4½	7 9¼	8 6½	8 9¼
Average	9 5	9 0½	8 2¾	8 0	7 5¾	7 3	7 4¼	7 2¼	7 2¾	7 4	8 3¾	8 9¼
1860	11 0	11 0	9 0	9 0	7 9	9 1	8 7	8 7	8 4	8 3	8 1	8 8
	10 2	9 3½	8 10	8 2½	7 7	8 7½	7 8½	7 6¼	7 9½	7 10½	7 10½	8 2¾
1861	9 0	8 11	9 7	8 11	7 5	7 0	7 11	10 2	10 2	10 7	9 10	10 6
	8 7	8 9	9 3	8 3½	7 2	0 11¼	7 6	9 2	8 11¾	9 8¾	8 10	9 9

Note.—This gauge shows the level of Lough Ree. The zero is the same as that of the upper sill at Athlone. The level of the water is influenced by wind.

J. F. B.

KILLALOE PIER HEAD.

Table showing the Height of Water on the following Days in 1881:—

Date.	Height.	Date.	Height.	Date.	Height.	Date.	Height.
	Ft. in.		*Ft. in.*		*Ft. in.*		*Ft. in*
August - - 20	10 4	November 13 -	9 0	December 3 -	10 3	December 20 -	10 4
„ - 23	10 5	„ 14 -	8 11½	„ 4 -	10 2	„ 21 -	10 4
September - 4	9 6	„ 15 -	9 0	„ 5 -	10 3	„ 22 -	10 3
„ - 11	9 2	„ 16 -	9 1	„ 6 -	10 3	„ 23 -	10 0
„ - 13	9 0	„ 17 -	9 0	„ 7 -	10 3	„ 24 -	10 0
November - 4	9 0	„ 18 -	9 0	„ 8 -	10 3	„ 25 -	9 5
„ - 5	8 11½	„ 19 -	8 11½	„ 9 -	10 3	„ 26 -	9 6
„ - 6	9 0	„ 20 -	8 11	„ 10 -	10 3	„ 27 -	9 6
„ - 7	9 0	„ 21 -	9 1	„ 11 -	10 2	„ 28 -	9 5
„ - 8	9 0½	„ 22 -	9 2	„ 12 -	10 3	„ 29 -	9 4
„ - 9	9 0	„ 23 -	9 2	„ 16 -	10 8	„ 30 -	9 4
„ - 10	8 11½	„ 24 -	9 3	„ 17 -	10 5	„ 31 -	9 3
„ - 11	8 11	„ 25 -	9 3	„ 18 -	10 5		
„ - 12	8 11½	December 2 -	10 3	„ 19 -	10 5		

KILLALOE PIER HEAD.

TABLES showing the Height of Water during the Year 1862.

Day of Month.	January.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft in.
1	9 0	10 9	8 11	9 3	0 1	8 2	8 3½	8 2½	8 0½	7 8	10 0	9 1½
2	0 0	10 11	8 10½	9 3	9 3	8 1	8 2½	8 2½	8 0½	7 10	9 10	9 1
3	8 11	10 11	8 9	0 4½	9 3	8 0	8 2½	8 2½	8 0	8 0	9 10	9 0
4	8 11	10 10½	8 8½	9 5	9 4	8 1	8 2	8 2½	8 0	8 1	9 10	9 0
5	8 9	10 10	8 8½	8 6½	0 3	8 1	8 3	8 3½	7 11	8 1½	0 10	9 0
6	8 8	10 10	8 0½	9 8½	8 4	8 1½	8 2	8 4	7 10½	8 2	9 9½	9 1
7	8 8	10 8	8 11	9 9	8 3	8 1½	8 1	8 5	7 10	8 4	9 0	9 3
8	8 8	10 8½	9 2	8 9½	9 3	8 2	8 1	8 5	7 9½	8 4	9 9	9 3
9	8 8	10 4	9 3	8 0½	9 3	8 1	8 1	8 5½	7 9	8 3	9 9	9 4
10	8 9	10 3	9 3½	9 9½	9 3	8 2½	8 2	8 5½	7 8½	8 1½	9 10	9 7
11	8 10	10 2	9 4½	8 7	9 1½	8 3½	8 1	8 6	7 8	8 0	0 11	9 10
12	8 10	10 1	9 8	0 8	9 0	8 4	8 1	8 6½	7 8	7 10½	10 0	9 10
13	9 0	9 10½	9 7	9 4½	8 11	8 6	8 1	8 6½	7 8	7 11½	9 10	9 10½
14	9 1	9 9½	0 9	9 3	8 10	8 7	8 0	8 6½	7 10	8 2	10 0	0 10½
15	9 2	8 9	0 0	9 2	8 9	8 10	8 0½	8 6½	7 9½	8 3	10 2	9 9
16	9 1	9 8	9 8½	8 0	8 8	8 11	8 1	8 0	7 9½	8 4	10 2	9 10
17	0 4	9 6	9 8	8 10	8 7½	8 11	8 1	8 6	7 9½	8 7	10 2	0 11½
18	9 4	9 2	9 8½	8 11	8 7	8 11	8 1½	8 5½	7 9½	8 9½	10 1½	10 1
19	10 0	9 2	0 8	9 0	8 7	8 11	8 2	8 5	7 9	8 11	10 0½	10 3
20	10 8	9 1	8 7	8 0½	8 7	8 9	8 2½	8 5	7 9	9 3	10 0	10 5
21	10 4	9 2	9 6	8 11½	8 8	8 9	8 2½	8 4	7 9	9 4	9 10	10 6
22	10 8	9 3	9 5½	8 11½	8 7½	8 8	8 2½	8 3½	7 0	9 6	9 9	10 4
23	10 6	9 4	9 4	8 11½	8 7½	8 7	8 2½	8 3½	7 9	9 8	9 8	10 4½
24	10 8	9 3½	9 3	9 2½	8 7½	8 7	8 0½	8 3½	7 8½	9 11	9 7	10 3½
25	10 6	8 2	9 2	9 2	8 7	8 8	8 1½	8 3	7 8	9 9½	9 8	10 3
26	10 8	9 2	9 1	9 2	8 7	8 6	8 1½	8 2½	7 8	9 11	9 5	10 1½
27	10 4	9 1	9 1	9 2	8 5	8 8	8 1½	8 2.	7 8½	9 10	9 4½	10 0
28	10 7	9 0½	8 1	9 1	8 6	8 5	8 1½	8 2	7 8	9 11	9 4	10 0
29	10 7	- -	9 1½	9 0	8 6½	8 4	8 1½	8 1½	7 8	10 0	9 3	9 11
30	10 8	- -	9 2	9 0	8 5½	8 3½	8 2	8 1½	7 7	9 10	9 2	9 11½
31	10 8	- -	9 2½	- -	8 8	- -	8 2½	8 1	- -	10 0	- -	9 10½

Note.—This gauge nearly represents the level of Lough Derg. The level of the water both here and at Portumna is influenced by wind.

J. F. B.

PORTUMNA BRIDGE.

Table showing the Height of the Water during the Year 1861.

Day of Month.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
	Ft. in.	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*
1	7 9	6 5	6 11	9 2	7 2	6 9	6 7½	7 10	9 2	10 3	8 4	10 1
2	7 9	8 5	6 10½ 9 7 (4 p.m.)	9 1	7 2	6 8½	6 8	8 0	9 0	10 5	8 4	10 0
3	7 8	8 5	9 8	9 1½	7 1	6 7½	6 8½	6 1	9 0	10 5	8 3	9 11
4	7 6	8 5	9 5	9 2	7 1	8 7½	7 3	8 0	8 10	10 4	8 3	9 11
5	7 8	8 6	9 8	9 1	7 0	6 6½	6 11	8 5	8 10	10 4	8 4	9 10
6	7 9	8 8	10 1	9 0	6 11	6 7	6 10	6 3	8 9	10 4	6 4	9 10
7	7 10	8 6	9 8 9 10 (5 p.m.	9 1	7 0	6 6½	8 10	8 4	8 8	10 3	8 3	9 11
8	6 0	8 5	9 9	9 1	6 11½	6 7	6 10	9 4	8 8	10 2	8 3	10 2
9	8 1	8 1	9 6	9 0	6 11½	6 7½	6 11	6 4	8 7	10 2	8 3	10 0
10	8 2	8 4	9 6	8 11½	8 11	6 7	7 0	6 4	8 7	10 1	8 3	10 1
11	8 3	6 4	9 6	6 10	6 10½	6 8½	7 1	6 2	6 7	10 7	8 6	10 7
12	8 4	8 3	9 4	6 8½	6 10	6 6	6 11	6 5	8 7	10 2	8 6	10 7
13	8 3	8 2	9 4	8 7	6 10½	8 9	7 1	6 6	9 0	10 5	8 5	10 2
14	8 6	8 1	9 4	6 5½	6 10	6 7	7 1	6 10	8 7	10 3	8 5	10 4
15	8 2	6 1	9 6	6 4	6 10	6 7	7 0	9 2	8 6	10 1	6 4	10 3
16	6 3	8 1	9 3	8 2½	6 10	6 6	7 8	9 6	6 8	10 1	8 4	10 3
17	8 2	8 2	9 3	8 1	6 10	6 7½	7 6	9 7	8 8	10 0	8 4	10 3
18	6 2	8 2	9 2½	8 0½	6 9½	6 7½	7 9	10 8	9 5	9 11	8 5	10 1
19	6 2	8 5	9 2	7 11	6 9	6 7	7 7	10 2	6 8	9 10	6 7	9 0
20	8 3	8 4	9 8	7 10	8 9	6 7	7 7	10 0	6 6	9 7	8 6	9 11
21	6 3	8 6	9 6	7 9	6 9	8 7	7 8	10 2	8 4	9 6	8 7	9 9
22	8 2	8 10	9 7 9 8	7 6½	8 9½	6 6½	7 7	10 8	8 6	9 4	8 10	9 7
23	8 2	8 10	9 6	7 7	6 9	6 7	7 6	10 8	8 6	9 4	6 10	9 5
24	8 3	6 11	9 7½	7 6	6 9	6 7	7 7	10 2	9 0	9 2	8 10	9 4
25	8 3	8 11	9 8 9 10	7 5½	6 10	6 8	7 9	10 2	9 0	9 1	9 2	9 0
26	8 3	8 11½	9 7	7 5	6 9	6 7	7 11	9 11	9 0	8 11	9 5	9 0
27	8 3	9 1	9 5	7 4	6 6	6 6	6 0	9 10	9 3	6 10	9 6	8 9
28	6 3½	6 11	9 5½	7 4	6 8	6 11	8 0	9 7	9 6	8 6	9 7	8 6
29	8 4	- -	9 3	7 8½	6 6	6 9½	8 0	9 9	9 8	6 8	9 11	6 6
30	8 4	- -	9 2	7 6	8 8	6 8	6 1	9 6	10 0	6 7	10 1	8 8
31	6 4	- -	9 1	- -	8 9	- -	7 11	9 5	- -	8 6	- -	8 4

PORTUMNA BRIDGE.

TABLE showing the Height of Water during the Year 1862.

Day of Month.	Jan.		Feb.		March.		April.		May.		June.		July.		August.		Sept.		October.		Nov.		Dec.	
	Ft.	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*	*Ft.*	*in.*
1	8	4	10	9	8	1	8	8	8	3	7	8	7	7	7	7	7	3	7	2	0	0	8	7
2	8	2	10	8	8	0	8	10	8	3	7	9	7	6	7	6	7	3	7	4	0	6	8	0
3	8	1	10	7	8	0	0	0	8	9	7	9	7	5	7	6	7	1	7	4	8	5	8	0
4	8	1	10	6	7	11	8	9	8	10	7	0	7	4	7	7	7	1	7	3	9	4	8	7
5	8	0	10	6	6	1	9	1	8	10	7	6	7	2	7	6	7	0	7	3	9	4	8	6
6	8	0	10	3	6	2	9	0	8	11	7	6	7	3	7	9	7	2	7	5	9	4	8	5
7	8	0	10	2	8	6	8	0	8	8	7	10	7	2	7	10	7	2	7	4	9	3	8	8
8	7	11	10	1	8	7	9	3	8	10	7	7	7	3	7	10	7	2	7	4	0	4	8	0
9	8	1	9	11	8	9	9	3	8	10	7	7	7	5	7	11	7	0	7	4	9	0	8	11
10	8	2	9	10	8	9	8	1	8	6	7	6	7	2	7	11	7	0	7	4	9	6	9	1
11	8	2	9	8	8	9	9	0	8	3	7	7	7	4	7	10	7	0	7	4	9	7	9	3
12	8	4	0	6	9	0	8	10	8	3	7	7	7	4	7	10	7	0	7	7	9	8	9	3
13	8	5	9	4	8	0	8	9	8	2	7	9	7	4	7	10	7	0	7	7	9	8	9	6
14	8	5	0	2	9	1	9	0	8	2	8	0	7	4	7	9	7	0	7	7	9	0	9	6
15	8	7	9	0	9	1	8	6	8	1	8	2	7	6	7	9	6	11	7	8	9	9	9	6
16	8	10	8	10	9	0	8	8	8	1	8	2	7	5	7	9	0	11	7	0	8	9	9	7
17	8	11	8	9	9	0	8	6	7	11	8	4	7	6	7	9	6	11	7	11	0	9	9	7
18	0	3	9	0	9	0	8	4	7	11	8	2	7	7	7	9	6	11	8	2	0	8	9	10
10	9	6	8	7	8	9	8	9	7	11	8	1	7	8	7	10	6	11	8	6	0	7	10	0
20	9	8	8	9	6	6	8	8	7	10	6	1	7	7	7	8	6	11	8	0	9	5	10	0
21	9	10	8	9	8	6	8	9	7	10	6	0	7	6	7	8	0	11	8	9	9	2	10	0
22	10	0	8	8	8	5	8	8	7	11	8	0	7	6	7	8	6	11	0	1	9	2	10	0
23	10	1	8	8	6	8	8	9	7	11	7	11	7	6	7	7	6	10	0	3	9	0	9	11
24	10	2	8	6	8	4	8	6	8	0	7	10	8	0	7	6	6	10	9	4	9	0	9	11
25	10	3	8	6	8	3	8	5	7	11	7	10	7	9	7	5	6	10	9	6	8	10	9	10
26	10	3	8	5	8	4	8	4	7	9	7	8	7	8	7	5	6	10	0	8	8	9	9	10
27	10	4	8	3	8	6	8	4	7	9	7	7	7	7	7	5	6	11	8	10	8	9	9	9
28	10	3	8	1	8	5	8	5	7	8	7	4	7	6	7	4	6	11	9	6	8	7	9	8
29	10	5	-	-	8	4	8	6	7	9	7	7	7	5	7	4	7	0	9	6	8	6	9	6
30	10	6	-	-	8	6	8	3	7	8	7	6	7	6	7	3	7	2	9	7	8	6	9	6
31	10	9	-	-	8	7	-	-	7	8	-	-	7	6	7	2	-	-	9	6	-	-	9	5

Note.—The Portumna gauge may be taken to represent the level of the water in Lough Derg. The zero of the gauge is about six inches higher than that of the gauges at Killaloe. The level of the water is influenced by wind.

J. F. B.

Sir, London, 14 May 1863.

Having perused and carefully considered the Report of Mr. J. F. Bateman on his inquiry, under the instructions of the Lords Commissioners of Her Majesty's Treasury, dated 16th July 1862, into the causes and effects of the Shannon inundations, which has been referred to the Board of Works, I have the honour to state, for their Lordships' information, that in regard to the general measures proposed for relieving the lands from flood being a question which more immediately affects the proprietors, I do not feel that the Board are called on to remark further than that the works appear well designed, and would probably be effective in each case, and as such the Board could not offer any objection.

With reference to the public interest in the navigation of the river, the maintenance of which, in its integrity, was one of the conditions laid down by their Lordships to be observed, the Board beg to state, that in one section only of the works proposed, namely, in that part of the river extending from Meelick upwards to Banagher, in respect to which two designs are put forward, does any interference with those interests occur; and they agree with Mr. Bateman in giving the preference to the second design, which proposes the construction of a new navigable canal from Victoria Lock, at Meelick, to the town of Banagher; and it appears to them that the facilities for navigation would in no degree be injured, but rather improved, by the adoption of the scheme, provided the width of the canal, which is not stated, be made not less than that of the existing short portion of canal immediately above the lock.

The Board would, however, wish it to be understood that in expressing their general approval of Mr. Bateman's Report, they do not accept, without reserve, the correctness of the facts put forward in regard to errors in the tables prepared by Mr. Harding, unimportant though they be, as not affecting the accuracy of the general conclusions arrived at with reference to the flood discharge of the river, both at the present time and prospectively.

I have, &c.
(signed) *Richard Griffith.*

G. A. Hamilton, Esq.,
&c. &c. &c.

SHANNON RIVER.

COPY of a REPORT made by Mr. *Bateman*, C.E., to the Lords Commissioners of Her Majesty's Treasury, with reference to the Means of preventing INJURY by FLOODING to LANDS adjoining the RIVER SHANNON, and of the OBSERVATIONS of the Board of Works, *Ireland*, in relation to that Report.

(*Mr. Brand.*)

Ordered, by The House of Commons, *to be Printed*,
19 *May* 1863.

[*Price* 3 *s.*]

292.

Under 8 *oz.*

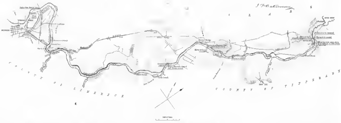
SHANNON INUNDATIONS INQUIRY.

PLAN
OF THE
# RIVER SHANNON
FROM
LIMERICK
TO
KILLALOE

Shewing the alterations recommended in Mr Bateman's Report of 9th May 1863

Sites of proposed works shewn Red.

J. F. Bateman



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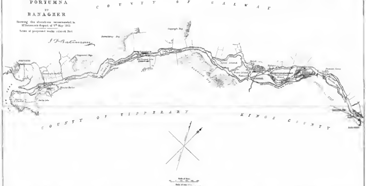
N° 2

PLAN
OF THE
# RIVER SHANNON
FROM
PORTUMNA
TO
BANAGHER

Shewing the alterations recommended in
M^r Bateman's Report of 7^th May 1863

Sites of proposed works coloured Red

J F Bateman



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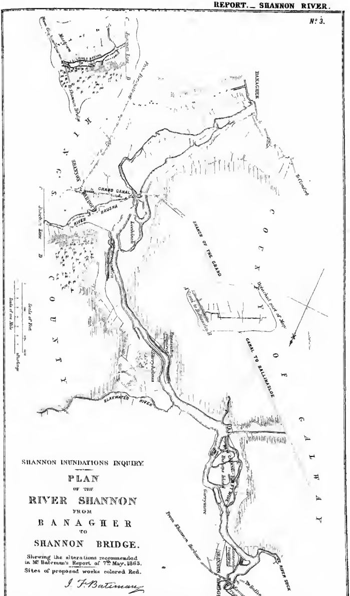

SHANNON INUNDATIONS INQUIRY.

PLAN
OF THE
RIVER SHANNON
FROM
BANAGHER
TO
SHANNON BRIDGE.

Shewing the alterations recommended in Mr. Bateman's Report of 7th May, 1863.
Sites of proposed works colored Red.

J. F. Bateman

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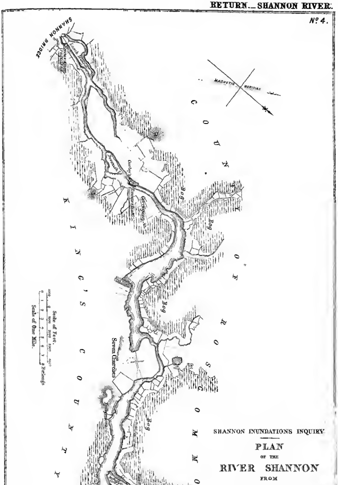


SHANNON INUNDATIONS INQUIRY

PLAN
OF THE
RIVER SHANNON
FROM
SHANNON BRIDGE.
TO
LONG ISLAND.

Shewing the alterations recommended in Mr Bateman's Report of 7th May, 1863.
Sites of proposed works colored Red

J. F. Bateman

No 292. Ordered, by the House of Commons, to be printed, 19 May, 1863.

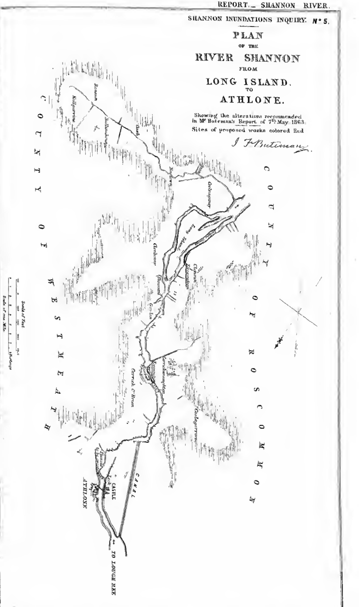
Henry Hansard Printer

SHANNON INUNDATIONS INQUIRY. N° 5.

PLAN
OF THE
RIVER SHANNON
FROM
LONG ISLAND.
TO
ATHLONE.

Showing the alterations recommended in Mr Bateman's Report of 7th May 1863.
Sites of proposed works colored Red

J F Bateman



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RETURN – SHANNON RIVER

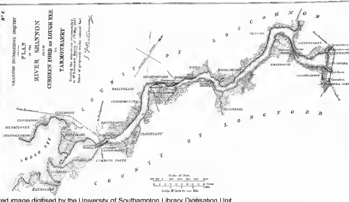
No 6

SHANNON INUNDATIONS INQUIRY

PLAN OF THE RIVER SHANNON FROM CURREEN FORD ON LOUGH REE TO TARMONBARRY

Showing the alterations recommended in Mr Bateman's Report of 7th May 1863
Sites of proposed works colored Red

J F Bateman



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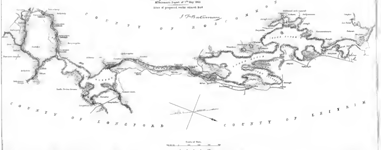
SHANNON INUNDATIONS INQUIRY

PLAN
OF THE
# RIVER SHANNON
FROM
TARMONBARRY
TO
JAMESTOWN CANAL

Shewing the alterations recommended in
Mr Bateman's Report of 7th May 1863

Sites of proposed works coloured Red

J F Bateman



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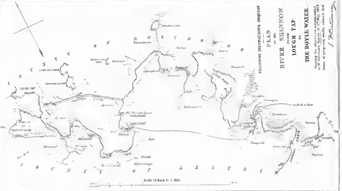

SHANNON INUNDATIONS INQUIRY

PLAN
of the
RIVER SHANNON
from
LOUGH TAP
to
THE BOYLE WATER.

Shewing the alterations recommended
in Mr Bateman's Report of 7th May 1863
Sites of proposed works coloured Red

J. F. Bateman

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Henry Hansard Lith

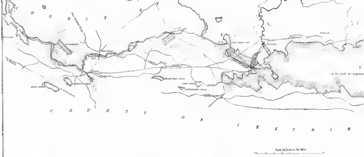
SHANNON INUNDATIONS INQUIRY

PLAN
OF THE
RIVER SHANNON
FROM
THE BOYLE WATER NORTH OF CARRICK ON SHANNON
TO THE
THE NORTHERN EXTREMITY OF LOUGH ALLEN
AND THE
TERMINATION OF THE NAVIGABLE PORTION OF THE RIVER.

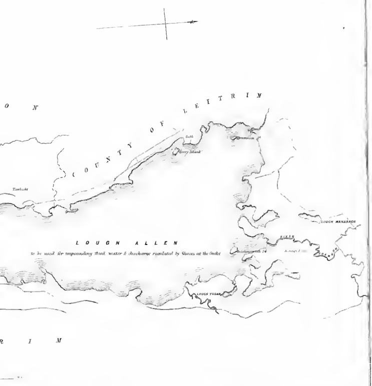
Showing the alterations recommended in
Mr Bateman's Report of 7th May 1863

Sites of proposed works colored Red

J F Bateman


C O U N T Y O F R O S C O M M O N
C O U N T Y O F L E I T R I M
LOUGH ALLEN CANAL
L O
Scale 1½ Inch to the Mile

N° 9



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